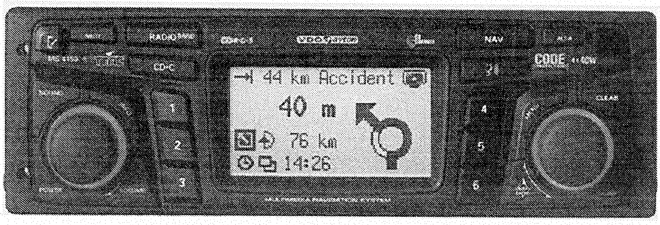
SIEMENS VDO
Automotive

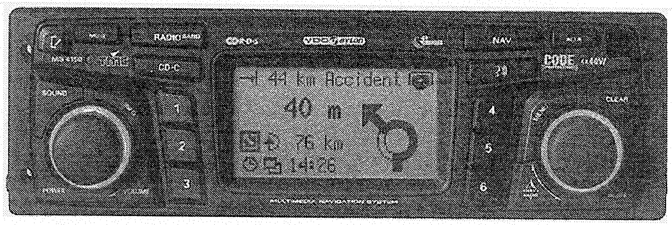
MS4150RS/00/01
NAV-R45 (Subaru)
MS4200RS/00/01
Mk4.5 Radio Navigation System

Service Manual

12 V


RADIO
NAV
CODE
44 km Accident
40 m
76 km
14:26

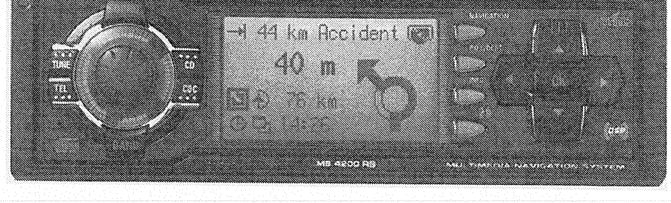
MS4150RS/00


RADIO
NAV
CODE
44 km Accident
40 m
76 km
14:26

MS4150RS/01

44 km Accident
40 m
76 km
14:26

MS4200RS/00


44 km Accident
40 m
76 km
14:26
MS 4200 RS

MS4200RS/01

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WARNINGS

CLASS 1
LASER PRODUKT

DANGER
Invisible Laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM

ATTENTION
Static Sensitive Devices
Handle Only at Static
Safe Work Stations.

General

This manual describes the 'Mk4.5' Radio-Navigation sets. These sets are built up as follows:

- P2000(E) radio and a 'RoadRunner' navigation computer, combined to one main PCB assy.
- CDM-M3/4.7 module.
- Front unit that in its turn contains a monochrome display.

All these devices are comprised in a '1 DIN' housing.

There are five versions described in this manual:

- MS4150RS/00: black front unit, 2 push / rotary buttons, white display illumination and red light button illumination.
- MS4150RS/01: black front unit, 2 push / rotary buttons, yellow display illumination and yellow light button illumination.
- NAV-R45: special Subaru version; black front unit, 2 push / rotary buttons, green display illumination and green light button illumination.
- MS4200RS/00: silver / chrome front base and -buttons with black or red inscription, 1 push / rotary encoder, blue / white display illumination and blue / red button illumination (illumination colour dependent on car light status).
- MS4200RS/01: black coloured front base and -buttons with white or red inscription, 1 push / rotary encoder, blue / white display illumination and blue / red button illumination (illumination colour dependent on car light status).

The global building-up of this manual is as follows: technical specifications, controls, MS4150RS / NAV-R45 version specific information, MS4200RS version specific information, list of acronyms / glossary, Mk4.5 system (base unit) description, trouble-shooting, tests, disassembly/re-assembly procedures, MS4150RS front unit circuit diagrams / PCB layouts (*Note: the circuit diagrams and layouts are also valid for the NAV-R45 versions, except the LED colours.*), MS4200RS Front unit: circuit diagrams / PCB layouts, Mk4.5 main PCB circuit diagrams and layouts, exploded views, spare parts and reference partslists. *Note: Although the different PCB's are complete spare parts, this manual contains all circuit diagrams and PCB layouts for reference and / or local repair purposes.*

For a description of the CD module, refer to the CDM-M3 service manuals 4822 725 25483 and 3112 305 60311; for the test software description, refer to the service manuals 4822 725 25495 and 3112 305 60291. Concerning the tests, one may refer to the 'General Checks & Alignment Procedure' manual 4822 725 25456.

Technical Specifications

General Specifications

Ambient temperature (functional):	-20....+55°C
Ambient temperature (full specification):	-20....+55°C
Supply voltages:	
- Full specification:	9 - 16.5V
- Degraded mode:	5.5 - 9V (no disc eject / loading, audio muted, display off)
- Power-down:	0 - 5.5V
Supply current (navigation computer):	typical 1A
Quiescent current:	<2mA
Power-down delay time:	40sec (normal - under software control)
Weight (navigation computer):	1.6kg (approx.)
Size (front not included):	179.6x158.2x50.6mm (WxDxH)

Absolute Maximum Ratings

Symbol	Parameter	Test condition	Rating	Unit
U_{bat}	Battery voltage	1min.	-3 to +24	VDC

All inputs and outputs from the connector block are short-circuit proof to the battery voltage (except the GND pins) and ground.

Other Specifications

For all specifications not mentioned here, refer to the technical descriptions elsewhere in this manual.

Controls

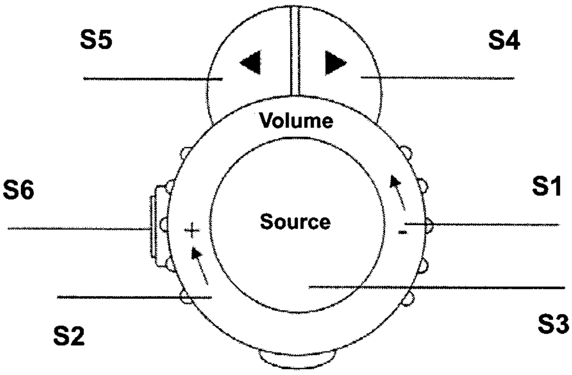
Front Unit Controls

For a description of the front unit controls, refer to the part concerned of the MS4150RS / NAV-R45 - or MS4200RS version description, elsewhere in this manual.

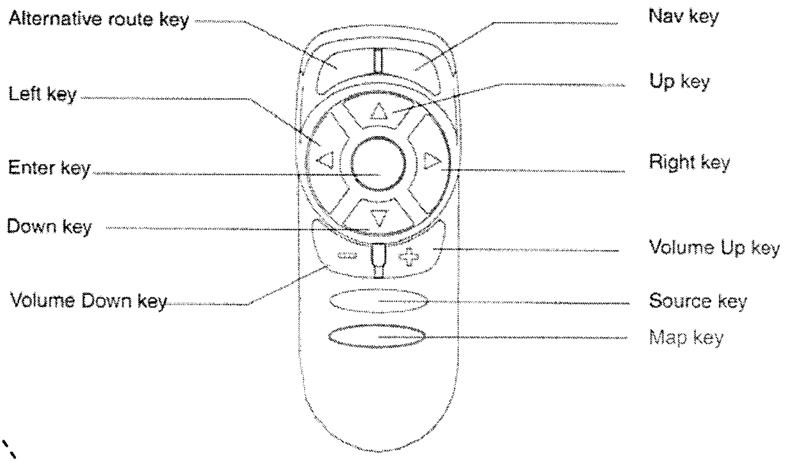
Remote Controls

The figure below shows the layout of the (optional) remote controls, followed by an explanation of the buttons.

Wired Remote Control (RC3)



IR Remote Control (RC5)



Control no.	Tuner function	CD / CDC function
S1	Volume down (rotate anti-clockwise)	Volume down
S2	Volume up (rotate clockwise)	Volume up
S3	*Short press:* Source selection *Long press:* Change wave band	Source selection
S4	Search up	*Short press:* Next track *Long press:* Fast forward scan
S5	Search down	*Short press:* Previous track *Long press:* Fast backward scan
S6	*Short press:* Next preset *Long press:* Station scan	*Short press:* Next disc *Long press:* Scan

Key	Application	Action
Alt. Route	Navigation	Plan alternative route
Nav	Navigation	Enter Navigation menu
Up	User Interface	Select previous item in a menu
Down	User Interface	Select next item in a menu
Left	User Interface	Select previous item value or activate selected DFA in Down direction
Right	User Interface	Select next item value or activate selected DFA in Up direction
Enter	User Interface	Menu item activation or DFA selection
Vol. Down	Audio	Increase selected sound setting value
Vol. Up	Audio	Decrease selected sound setting value
Source	State control	Source selection
Map	Navigation	Select Map mode

MS4150RS / NAV-R45 VERSIONS

General

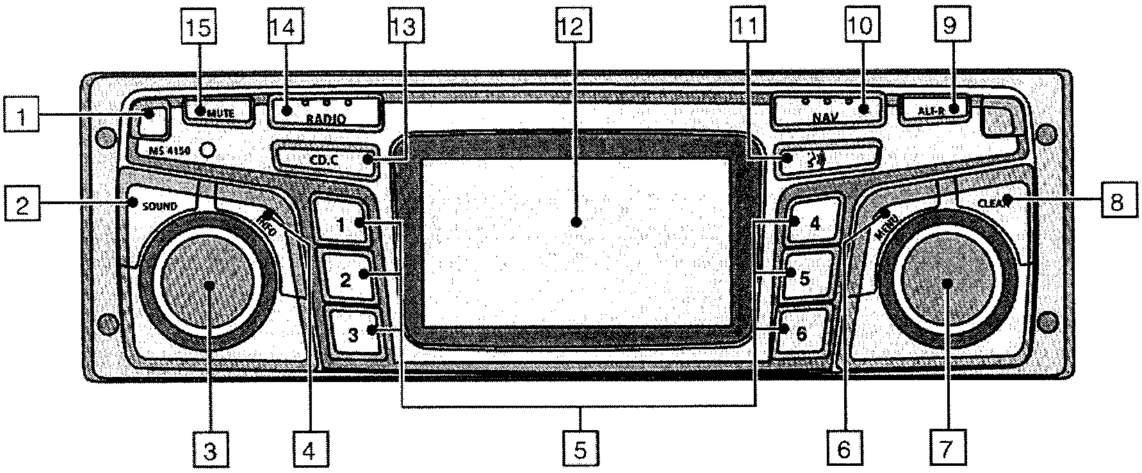
The MS4150RS front unit has two versions:
- -/00 version: display with white background illumination and red light button illumination.
- -/01 version: display with yellow background illumination and yellow light button illumination.

The NAV-R45 front unit is equal to the MS4150RS front unit, except green background illumination and green button illumination.
Unless otherwise noted, the description hereafter is valid for all three versions.

Front Unit Controls

Controls / Button Overview

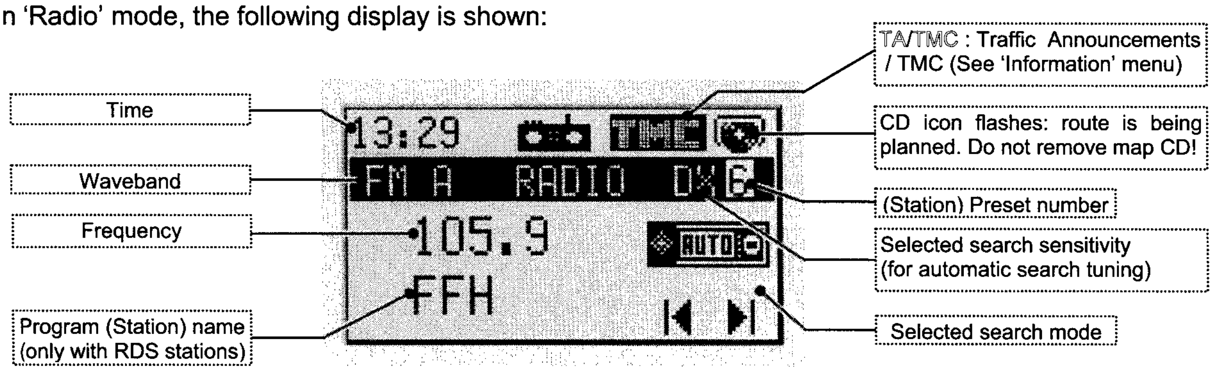
The next figure shows the layout of the MS4150RS / NAV-R45 front. An explanation of each button is given also.



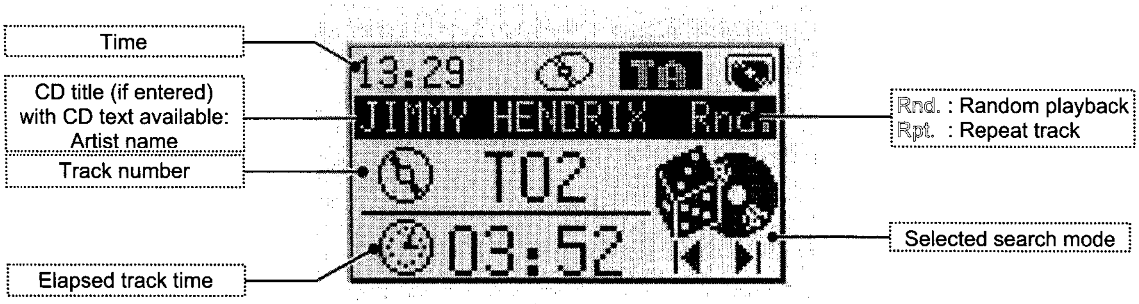
1	**[/**	Release button for operating panel.
2	**SOUND**	Invokes the 'Sound' menu. See for a description elsewhere in this manual.
3	**POWER/VOLUME**	Left rotary encoder: Press to switch on/off; turn to adjust the volume.
4	**INFO**	Invokes the 'Information' menu. See for a description elsewhere in this manual.
5	**1...6**	*Radio mode*: Station preset button: Briefly pressing selects preset station; pressing and holding stores the tuned station under the preset button concerned.
		CD changer mode: Selects one disc (1 out of 6) of the CD changer (if connected).
6	**MENU**	Opens the relevant menu within the currently operating mode (Radio, CD player, CD changer or Navigation).
7	**SCAN**	Right rotary encoder: Press to confirm a menu (selection); turn to select a menu.
		Radio, CD player / - changer mode: Search / Scan radio stations resp. CD tracks.
8	**CLEAR**	Deletes the last entry and/or returns to the next higher menu level.
9	**ALT-R**	Plans an alternative route when the set is in 'Navigation' mode.
10	**NAV**	Enters the 'Navigation' mode and - menu.
11	🗣)))	Play-back current direction and (if available) the current TMC message.
12		Display.
13	**CD•C**	Switch to CD player or CD changer (if connected).
14	**RADIO**	Switch to 'Radio' mode.
	BAND	Invokes the 'Band Selection' menu (only when in 'Radio' mode).
15	**MUTE**	With mobile phone (GSM) connected: Switch to telephone input; Without mobile phone (GSM) connected: Mutes the system audio.

Displays

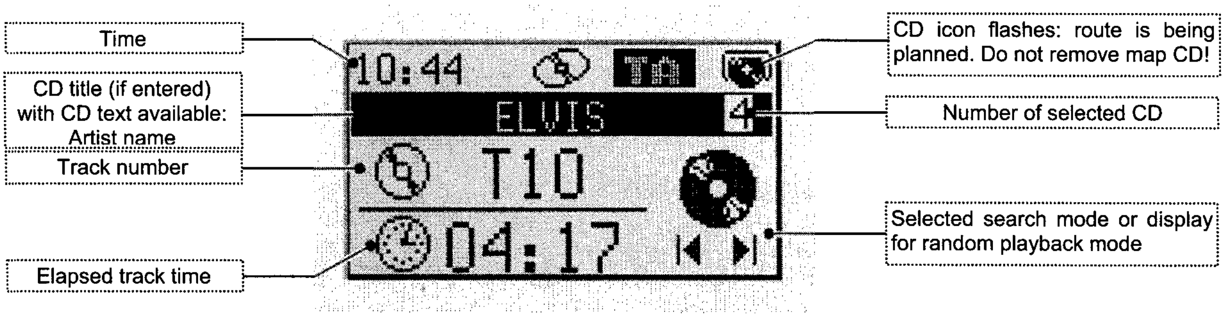
In 'Radio' mode, the following display is shown:


Time
Waveband
Frequency
Program (Station) name (only with RDS stations)
13:29
TMC
FM A RADIO DX 6
105.9
AUTO
FFH
TA/TMC : Traffic Announcements / TMC (See 'Information' menu)
CD icon flashes: route is being planned. Do not remove map CD!
(Station) Preset number
Selected search sensitivity (for automatic search tuning)
Selected search mode

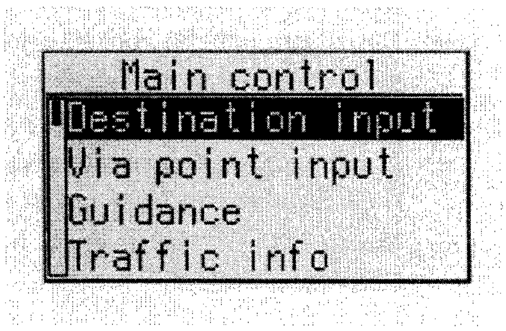
In 'CD Player' mode, the following display is shown:


Time
CD title (if entered) with CD text available: Artist name
Track number
Elapsed track time
13:29
TA
JIMMY HENDRIX Rnd.
T02
03:52
Rnd. : Random playback
Rpt. : Repeat track
Selected search mode

In 'CD Changer' mode, the following display is shown:


Time
CD title (if entered) with CD text available: Artist name
Track number
Elapsed track time
10:44
TA
ELVIS 4
T10
04:17
CD icon flashes: route is being planned. Do not remove map CD!
Number of selected CD
Selected search mode or display for random playback mode

In 'Navigation' mode, the following display is shown:


Main control
Destination input
Via point input
Guidance
Traffic info

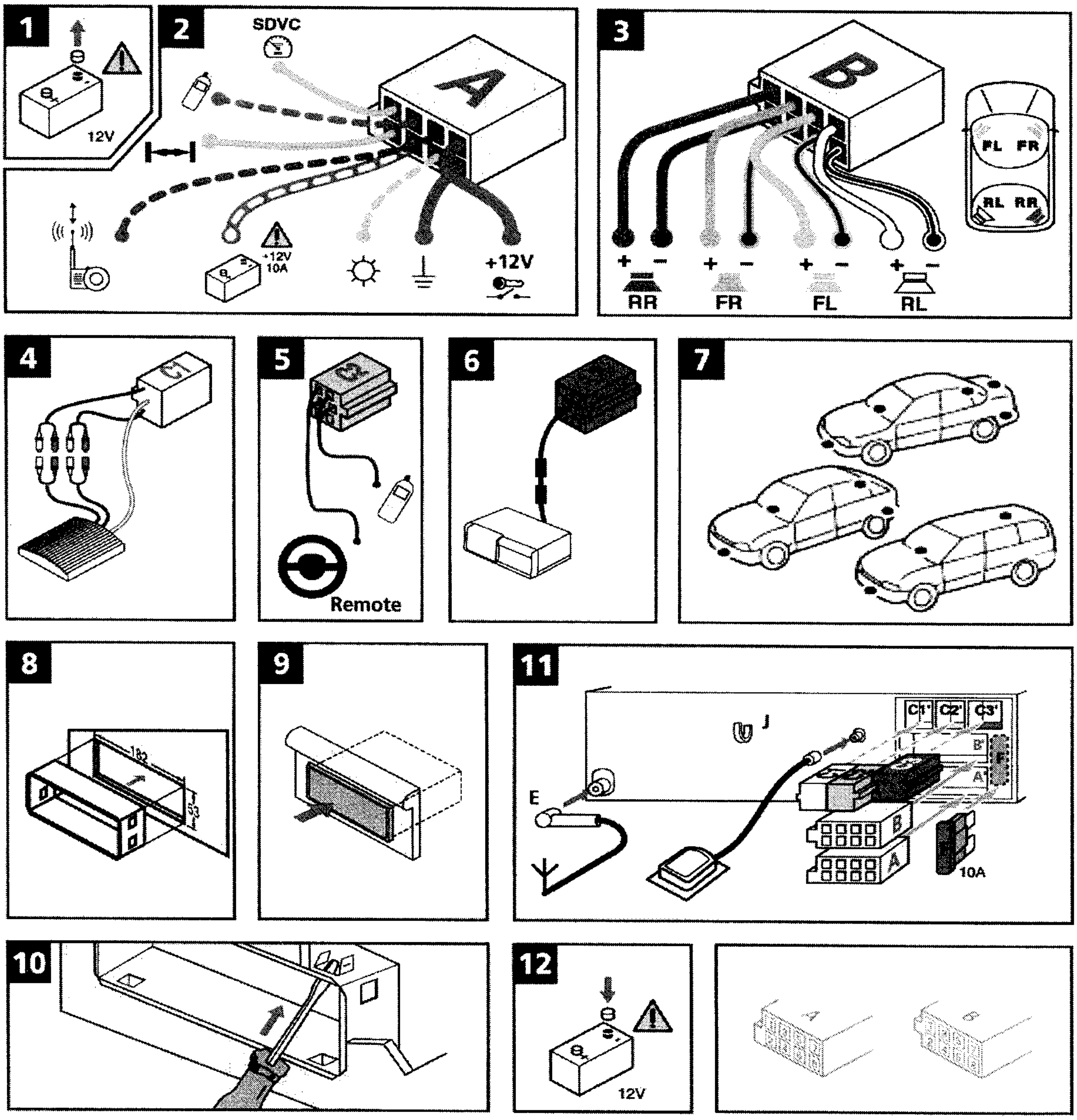
Note: All display values, parameters etc. in every figure in this chapter are examples!

By turning the right rotary encoder, all submenus can be scrolled through and by pressing the right rotary button the highlighted menu is selected. Refer for all possible menus to the 'Operation' part of this chapter.

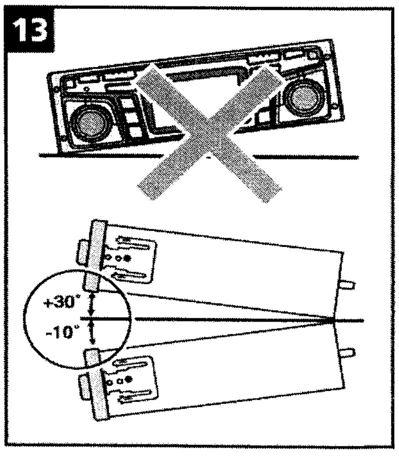
Installation

Installation Chart

The chart below shows how all car equipment should be connected. A brief explanation is given for each sub-figure.


1
12V
2
SDVC
A
+12V
10A
+12V
3
B
FL FR
RL RR
+ − + − + − + −
RR FR FL RL
4
C1
5
C2
Remote
6
7
8
182
53
9
11
J
E
C1' C2' C3'
B'
A'
B
A
10A
10
12
12V

1. Disconnect the cable from the '-' battery pole.
2. Connect all car devices to block A as indicated. Refer to the section 'Connections' if necessary.
3. Connect all car loudspeakers to block B as indicated.
4. Connect the booster (if present) to block C1.
5. Connect 'Steering' wheel remote control to block C2.
6. Connect the CD changer (if present) to block C3.
7. Places where the GPS antenna can be installed.
8. How the sleeve should be mounted into the dashboard.
9. Insert the Mk4.5 set provisionally to see if there is sufficient space.
10. Bend the lips of the sleeve to fix it to the dashboard.
11. Look if all connections are made (A, B, C1/2/3, Radio - and GPS antenna) and the right fuse (10A) is present.
12. Re-connect the '- ' battery pole (earth) cable.
13. The set should be mounted horizontally (no swivel, tilt angle should be within the limits: -10°...+30°).



Operation

Initial Operation

After installing the set, a proper operation can be checked in the following way:
1. Restore complete functioning of the car electronic system.
2. Switch on the ignition key.
3. Insert a map CD into the Mk4.5 set. To register the system and activate the map -, travel and/or traffic information, refer to the sub-section 'C-IQ' elsewhere in this manual.
4. Ensure that a proper GPS signal can be received.
5. Press the 'Navigation' (NAV) button and confirm the user information by pressing the right rotary control. The main control menu appears and the Mk4.5 set starts its initialization.
6. Wait approximately 10 minutes until the GPS reception is satisfactory.

Setting the Mounting Angle

In order to ensure proper operation of the set, its 'mounting angle' setting must be adjusted in accordance with the actual mounting angle in the instrument panel or dashboard. This is achieved in the following way:
1. When the set is in 'Navigation' mode: Select the '(System) Settings' menu and thereafter select the 'Mounting angle' submenu.
2. Dependent on the actual mounting angle, set the right angle value (between -10°...+30°). Note that the set does not differentiate positive or negative angle values. Therefore, set the value to '10' for an angle of -10°.

Loudspeaker Test

To check whether all loudspeakers are connected and operate well, a loudspeaker test can be invoked by selecting the following menus: Initialization > Loudspeaker Test.

Time Zone and Clock Adjustment

To set the Mk4.5 clock to the right time, select the following menus: Initialization > Clock Settings, and select 'GPS Clock Type' and select the right time zone. If necessary, insert the right time format (12h or 24h).

Security Code

The Mk4.5 set can be protected against theft with help of a security code (4 digits). The set is disabled and cannot be used as soon it is disconnected from the battery voltage supply (e.g. in case of theft). The set can only be re-activated by entering the correct security code.
The code can either be activated, de-activated or changed. Do the following steps:
1. Select the security code submenu via: Initialization > Security Code.
2. Enter the first digit by turning the right rotary encoder and press it to confirm the right digit. When a wrong digit is entered, press the 'Clear' button.
3. Enter the next three digits in a similar way and exit the 'Security Code' menu.

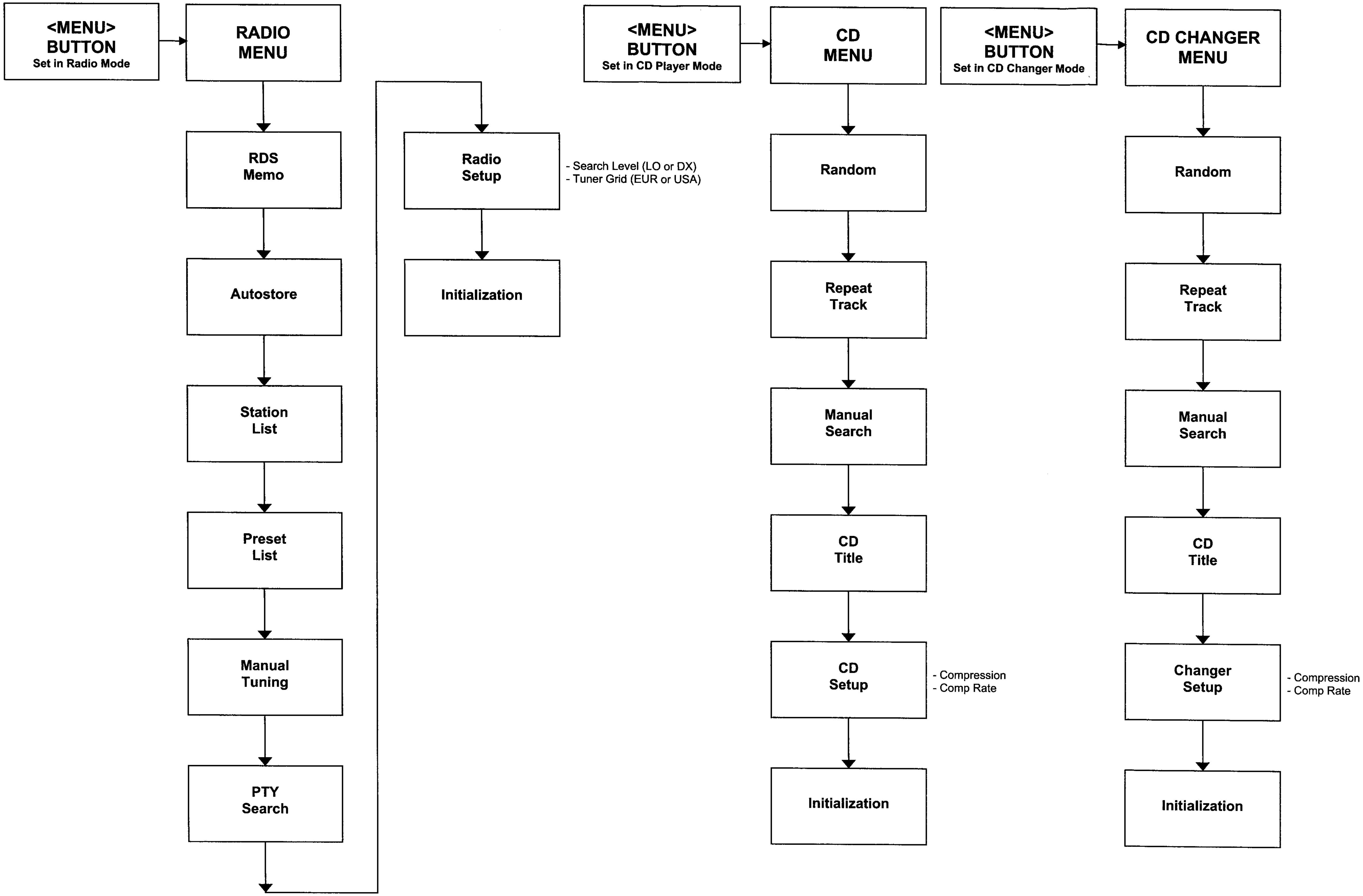
Changing the security code can be done by entering 4 new random chosen digits. De-activation is done by setting all 4 digits to '0'.
Note that the set is disabled completely after entering 10 wrong security codes. In that case, the set can only be recovered by a qualified service department.

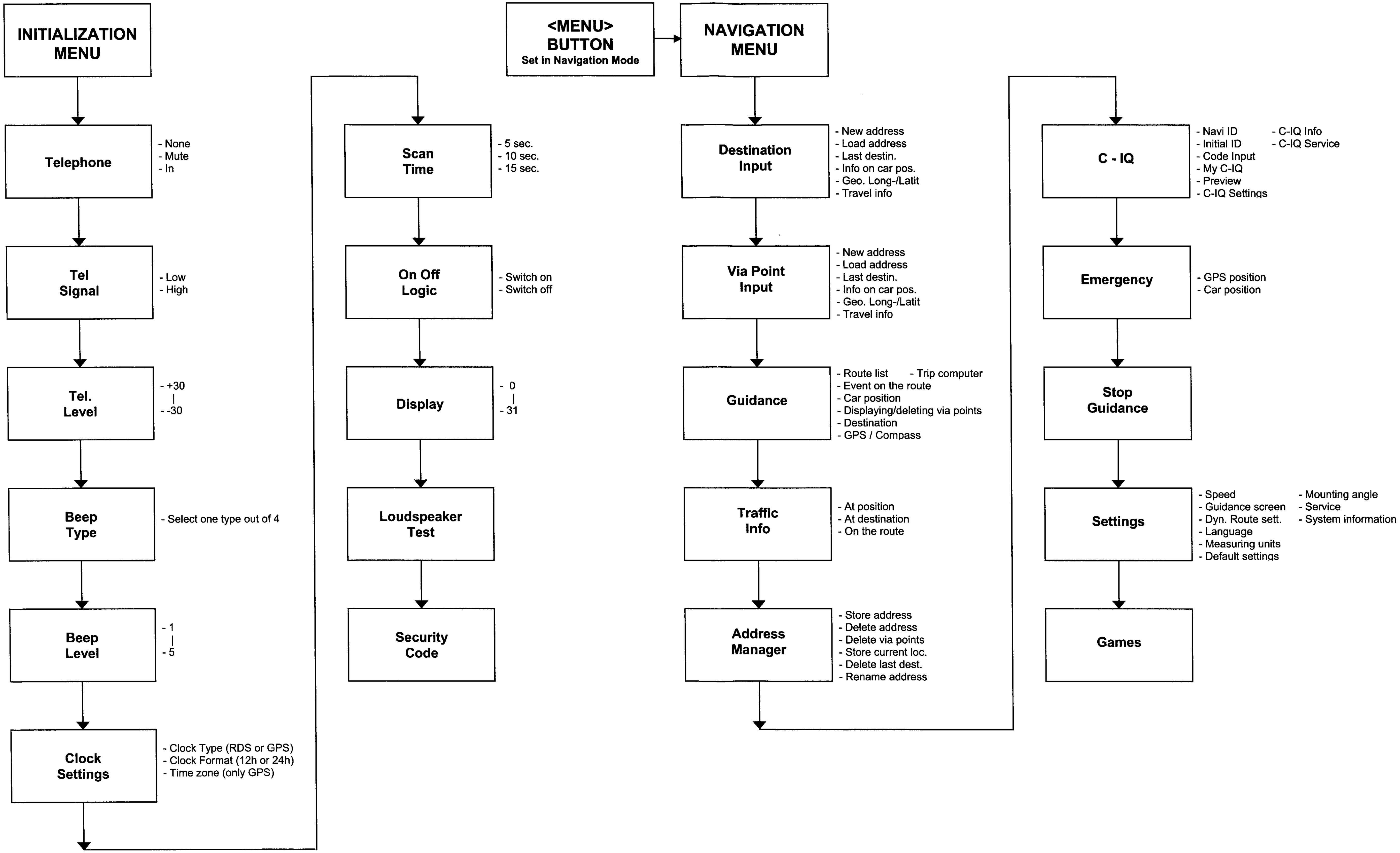
Anti-Theft Protection LED

When the set is switched off and when the ignition key is removed, then the anti-theft protection LED blinks. Note that this LED flashes only when the security code is enabled (see before).

Menu Operation

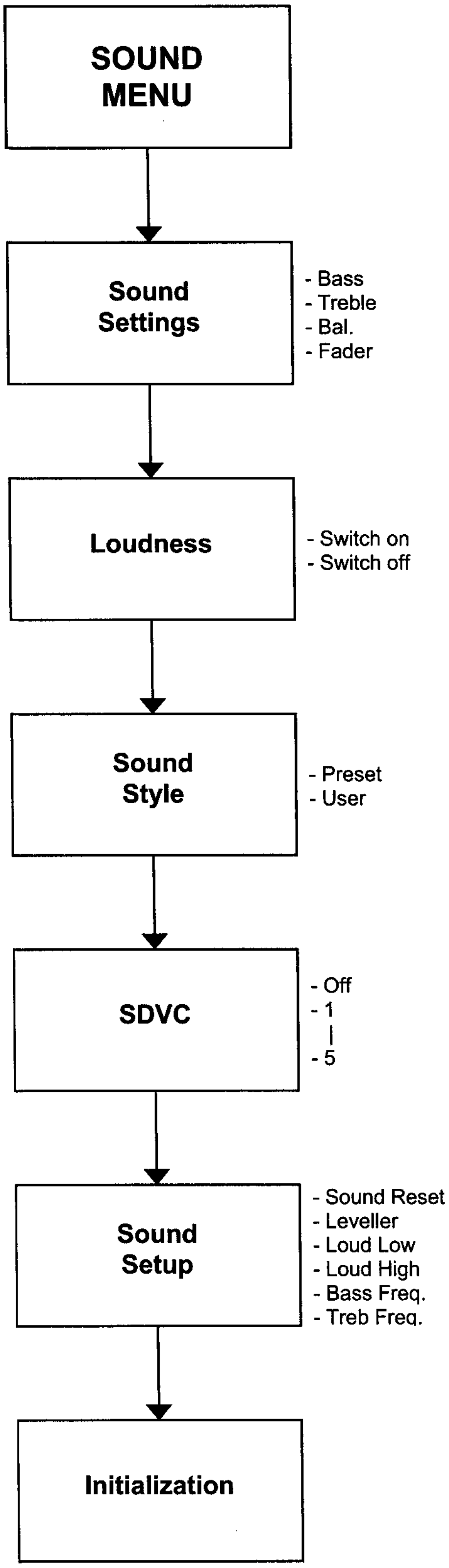
Press the 'Menu' button to enter one of the following menus (dependent on the current operation mode of the set): Radio, CD, CD changer, Navigation. The next pages show the complete menu overview with their parameters as far as applicable.

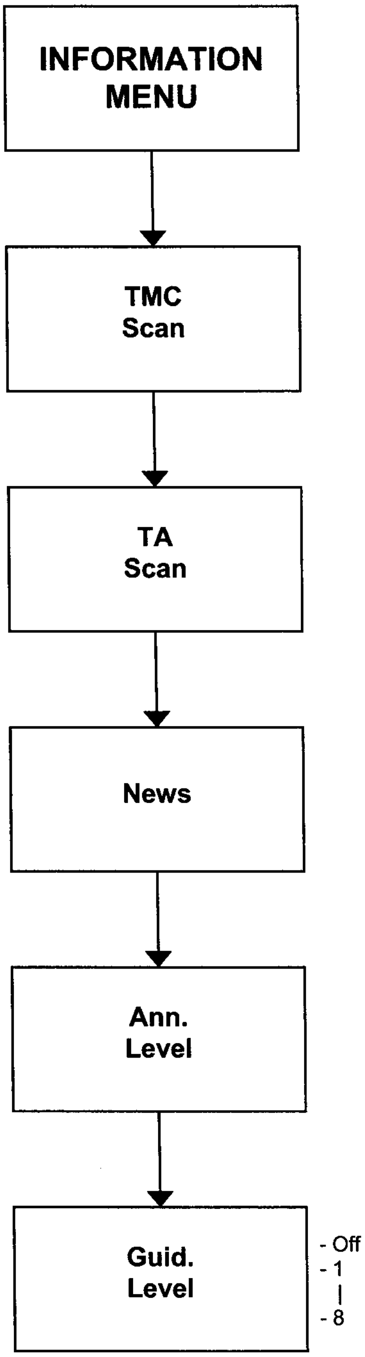

<MENU> BUTTON
Set in Radio Mode
RADIO MENU
RDS Memo
Autostore
Station List
Preset List
Manual Tuning
PTY Search
Radio Setup
- Search Level (LO or DX)
- Tuner Grid (EUR or USA)
Initialization
<MENU> BUTTON
Set in CD Player Mode
CD MENU
Random
Repeat Track
Manual Search
CD Title
CD Setup
- Compression
- Comp Rate
Initialization
<MENU> BUTTON
Set in CD Changer Mode
CD CHANGER MENU
Random
Repeat Track
Manual Search
CD Title
Changer Setup
- Compression
- Comp Rate
Initialization


INITIALIZATION MENU
Telephone
- None
- Mute
- In
Tel Signal
- Low
- High
Tel. Level
- +30
|
- -30
Beep Type
- Select one type out of 4
Beep Level
- 1
|
- 5
Clock Settings
- Clock Type (RDS or GPS)
- Clock Format (12h or 24h)
- Time zone (only GPS)
Scan Time
- 5 sec.
- 10 sec.
- 15 sec.
On Off Logic
- Switch on
- Switch off
Display
- 0
|
- 31
Loudspeaker Test
Security Code
<MENU> BUTTON
Set in Navigation Mode
NAVIGATION MENU
Destination Input
- New address
- Load address
- Last destin.
- Info on car pos.
- Geo. Long-/Latit
- Travel info
Via Point Input
- New address
- Load address
- Last destin.
- Info on car pos.
- Geo. Long-/Latit
- Travel info
Guidance
- Route list
- Trip computer
- Event on the route
- Car position
- Displaying/deleting via points
- Destination
- GPS / Compass
Traffic Info
- At position
- At destination
- On the route
Address Manager
- Store address
- Delete address
- Delete via points
- Store current loc.
- Delete last dest.
- Rename address
C - IQ
- Navi ID
- Initial ID
- Code Input
- My C-IQ
- Preview
- C-IQ Settings
- C-IQ Info
- C-IQ Service
Emergency
- GPS position
- Car position
Stop Guidance
Settings
- Speed
- Guidance screen
- Dyn. Route sett.
- Language
- Measuring units
- Default settings
- Mounting angle
- Service
- System information
Games

Sound Menu / Information Menu

These menus are invoked by pressing the ‘Sound’ resp. the ‘Info’ button. The complete menu overview is shown together with their parameters as far as applicable.


SOUND MENU
Sound Settings
- Bass
- Treble
- Bal.
- Fader
Loudness
- Switch on
- Switch off
Sound Style
- Preset
- User
SDVC
- Off
- 1
|
- 5
Sound Setup
- Sound Reset
- Leveller
- Loud Low
- Loud High
- Bass Freq.
- Treb Freq.
Initialization


INFORMATION MENU
TMC Scan
TA Scan
News
Ann. Level
Guid. Level
- Off
- 1
|
- 8

Radio Operation

- Press the 'Radio' button (when the set was in an other operation mode yet).
- Press the 'Radio' button again to select a waveband.
- Now stations can be selected either automatically or manually. In the first case one can search for the strongest stations, those which send traffic announcement messages, and those which send traffic information by TMC. On the other hand, it is also possible to scan each station that can be recepted.
  In the second case, the frequency can be selected manually by turning slowly the right rotary encoder to the right or left until the desired frequency is being reached.
- Preset stations can be stored by pressing one of the six preset keys until a confirmation tone (beep) is heard. (*Note*: this is not possible for the FM AS and MW AS wavebands, as these bands are reserved for the 'Auto-Store' function.)
- A stored (preset) station can be restored easily by selecting the right waveband first and pressing the right preset key thereafter.
- Detailed radio settings and - parameters can be invoked by using the 'Radio' menu.

CD Player / CD Changer Operation

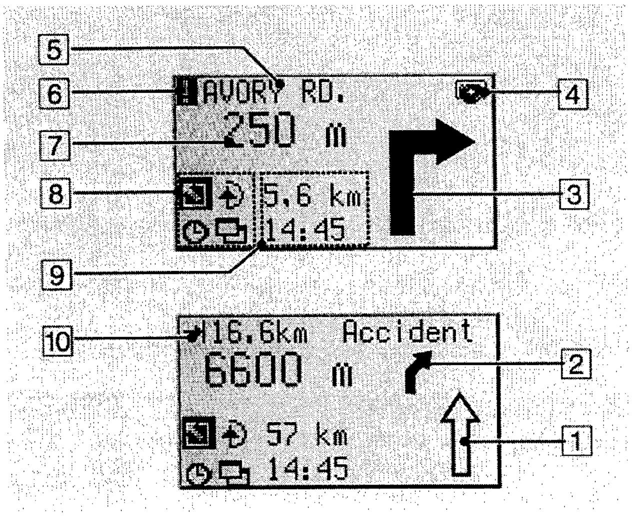
- Press the 'CD•C' button once or twice until the display shows 'CD PLAYER'.
- When a CD was still in, playback is resumed at the last played track.
- (*Only for CD changer operation*): Press one of the six preset buttons to select the desired CD in the changer out of six.
- Dependent on what one desires, there can be jumped to the right track (previous/next), or each track can be scanned one by one. By turning the right rotary encoder slowly, one can select previous or next track(s) to have a more accurate scan; turn the right rotary encoder quickly a few notches to start the second, faster or search scan level.
- Press the right rotary control to stop the fast search / scan function.
- Press it again to return to the 'skip track' function.
- During manual search, the CD sound is heard at increased speed.
- Detailed CD Player / CD Changer settings and - parameters can be invoked by using the 'CD' menu.

Navigation Operation

- Press the 'Nav' button to enter the navigation mode of the Mk4.5 set.
- First, enter the destination and, if necessary, enter the 'via point' i.e. stops on the way to the destination address.
- One can select the 'Guidance' option now (see the description in the following paragraph) or first select the other options to adjust the right navigation parameters and - settings. See the overview below:
  - Traffic info: This option is used to access information about current traffic conditions analysed by the navigation radio via RDS-TMC. To do this, first the 'C-IQ Traffic Info' data option must be activated.
  - Address manager: With help of this menu, handling of frequently used addresses for destinations and via points can be done.
  - C-IQ: For a description, refer to the part concerned elsewhere in this manual.
  - Emergency: Here, information on the current car position and geographic position is obtained. This can be useful for first aid purposes in case of an accident or other troubles.
  - Stop guidance: This option is used to switch off the navigation display and the audible (guidance) information. The system's navigation functions remain active (background operation).
    Press the 'Nav' button again to resume the complete navigation operation.
  - Settings: This function opens the 'System settings' submenu. In this menu, navigation settings can be customized.
  - Games: When not driving (e.g. waiting for a passenger), time can be passed by one of the available games.
- Detailed navigation settings and - parameters can be invoked by using the 'Navigation' menu.

Guidance Operation

The guidance screen appears as soon as the 'Navigation-Guidance' function is enabled. The layout follows in the figure hereafter, followed in its turn by a brief explanation.

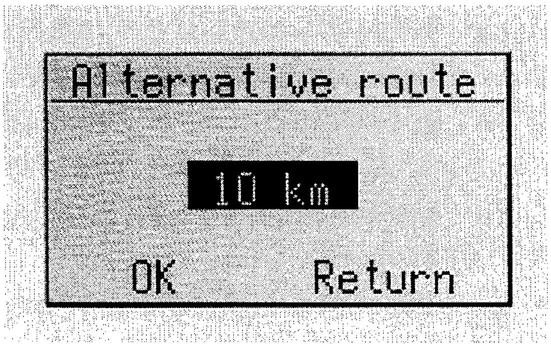


1 Road direction arrow: The arrow indicates the course of the road.
2 Simplified presentation of the next turn-off prompt.
3 Turn-off prompt: A graphic display of the next junction or turn-off. In addition, direction changes are announced with help of audible messages.
4 CD symbol:
Flashing black: The navigation computer is loading map data for the navigation corridor. The map CD must not be removed during this process.
Flashing grey: This is a sign to insert a map CD (the navigation computer needs to (re-)load the map data).
5 Road where to turn into at the next announcement.
6 Note of exclamation: This sign indicates that the car is within an area with incomplete map information.
7 Distance to the next change of direction. Note: the value and indication depend on the initial settings (km / m or miles / yards).
8 Option field. Move the cursor to the required symbol and confirm:
◩ : Return to the main control menu.
⊕ : Go to 'Alternative route' menu.
◷ : Display and select route criterion.
⧉ : Go to 'Information' screens.
9 Status field; displays one of the following possible parameters:
- Remaining driving distance.
- Remaining travel time.
- Estimated time of arrival.
- Current time.

The status field can be configured with help of the 'System settings' menu.
10 As soon as any traffic obstruction reported by TMC pertain to the planned route, a brief message appears, indicating the type of the (nearest) obstruction and the distance to it.

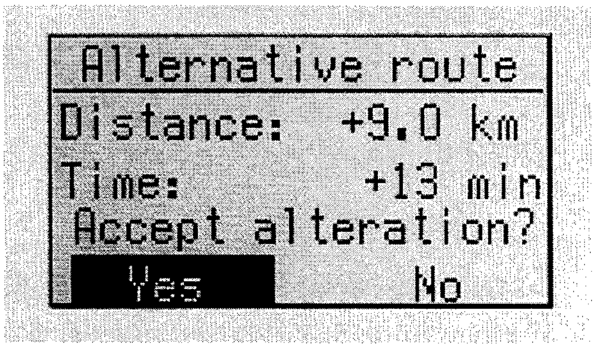
Alternative Route

During guidance, it is possible to plan an alternative route for the navigation system, e.g. when there's a queue, accident etc. and when this is not reported by TMC.
The alternative route is calculated for a selectable distance from the current car position.
To plan an alternative route, do the following steps:
1. Press the 'ALT-R' button or
Move the cursor to the '⊕' symbol in the guidance screen and confirm by pressing the right rotary control.
2. Select the right distance (see the first figure hereafter) and confirm it by 'OK'.
3. The navigation computer plans an alternative route and after some time a screen with details (distance / diversion and time delay / saving) is shown. See the second figure hereafter:


Alternative route

10 km

OK Return


Alternative route
Distance: +9.0 km
Time: +13 min
Accept alteration?

Yes No

4. Confirm the planned alternative route by either selecting 'Yes' or 'No' and confirming it by pressing the right rotary control.
5. In case of rejecting the alternative route, the navigation computer plans a new route to the destination from the current car position, whereafter the guidance screen reappears.
6. In case of cancelling the 'alternative route' procedure, select 'Return' (see first figure) and press the right rotary control.
7. In case of changing the distance, do the following steps:
   - Move the cursor to the displayed distance and press the right rotary control.
   - Change the displayed distance in the range of 1...10km by turning the right rotary encoder.
   - Press the right rotary control to confirm.
   - Select 'OK' and press to confirm.

Route Selection

During guidance, the desired route type (criterion) may be selected and the 'dynamic route planning' may be either activated or de-activated.
To select or change the route type, select the icon by turning the right rotary encoder until the icon is highlighted. Press the right rotary control to see a list with the following route criterions:

- Dynamic route planning: use this option to specify whether or not TMC traffic information should be taken into account during route planning.
- Fast: If a route must be planned with the least time; it is indicated by the symbol '🕒'.
- Short: If a route must be planned with the shortest distance; it is indicated by the symbol '⇤⇥'.
- Main roads: If motorways should be (a part of) the route; it is indicated by the symbol '🛣'.
- No main roads: If the route shouldn't lead along motorways but only along secondary roads; it is indicated by the symbol '🛣̸'.

In addition, one may choose the 'No toll road' option; when enabled, a check mark ('✔') appears in front of this option.

Information screens

To invoke the information screens, select the symbol '▭' and press the right rotary control. Then the following items may be selected: Route list, Event on the route, Car position, Displaying/deleting via points, Destination, GPS / Compass and Trip computer. Refer also to the menu overviews elsewhere in this chapter.

C-IQ

General

C-IQ (Intelligent Content on demand (Question)) is a system that makes it possible to use only the relevant information necessary at a certain moment for navigation. The data on the navigation CD is encrypted and can either partially or completely be activated by an access code, for a defined period. The main advantages are:

- One only pays for the information that is actually used.
- One only pays for the time period during which navigation is used.
- After the first C-IQ activation, one receives subsequent CD updates automatically.
- One has always the latest information.
- One can get hold of the activation easily via different information channels.

Activation Options

The CD contains the latest version of the road map software. It also contains travel guide information for a number of countries as well as traffic information for dynamic route planning via TMC (in countries which offer this service).
One can activate:

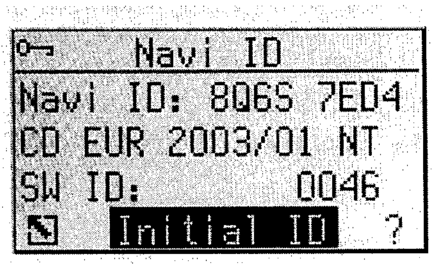
- The road data,
- Individual travel guides and, if required:
- Traffic information

In a number of countries for a certain time period. See the paragraph before.

Registering the navigation system

In order to activate C-IQ products, one must register his/her navigation system with C-IQ Service. Registering the system also provides anti-theft protection.
To register the navigation system, the 'Navi ID' number is required. In a small number of cases, the 'Initial ID' or version number of the map sofware is also required.
This data can be accessed as follows:

1. Press the 'NAV' button.
2. In the 'Main control' menu, select 'C-IQ'.
3. Select 'Navi ID'.
4. The 8-digit 'Navi ID', the currently loaded map CD and the version number of the navigation software are displayed.
5. To read out the 'Initial ID', move the cursor to 'Initial ID' - by turning the right rotary encoder - and confirm the selection by pressing the rotary button.
6. By selecting the '⇲' symbol the previous menu is invoked and by selecting the '?' symbol one can get help information.
7. The 'Navi ID' should be noted (at a secret place!) and/or remembered. To register the system, contact the C-IQ Service department and state the 'Navi ID' code.

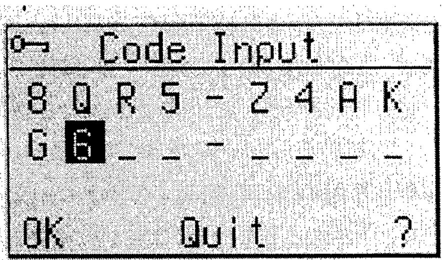


Navi ID
Navi ID: 8Q6S 7ED4
CD EUR 2003/01 NT
SW ID: 0046
⇲ Initial ID ?

Activating Products

Once one has received the enable code, it can be entered into the system in the following way:

1. In the 'Main control' menu, select 'C-IQ' and then 'Code Input'.
2. The cursor automatically appears at the first digit of the code; press the right rotary control to activate each code digit.
3. Next, turn the right rotary encoder to select the correct code digit and press the rotary button to confirm.
4. If necessary, a digit can be changed by selecting it by the right rotary encoder; press it, select a new digit (see before) and confirm.
5. Once the code is complete, the cursor automatically moves to the 'OK' field. Confirm 'OK' by pressing the right rotary control.



Code Input
8 Q R 5 - Z 4 A K
G 6 _ _ - _ _ _ _
OK Quit ?

6. Once the correct code is entered, the system displays information about the C-IQ products that are just activated. The system also gives information when e.g. an incorrect code has been entered, and/or if the system software is not capable of processing the encrypted information from the CD. In these cases, either the 'OK' - or 'C-IQ Service' should be selected and confirmed.

It is possible to operate the Mk4.5 system without C-IQ activation. Destinations can be entered normally; however, navigation information is only provided for activated areas and - services.

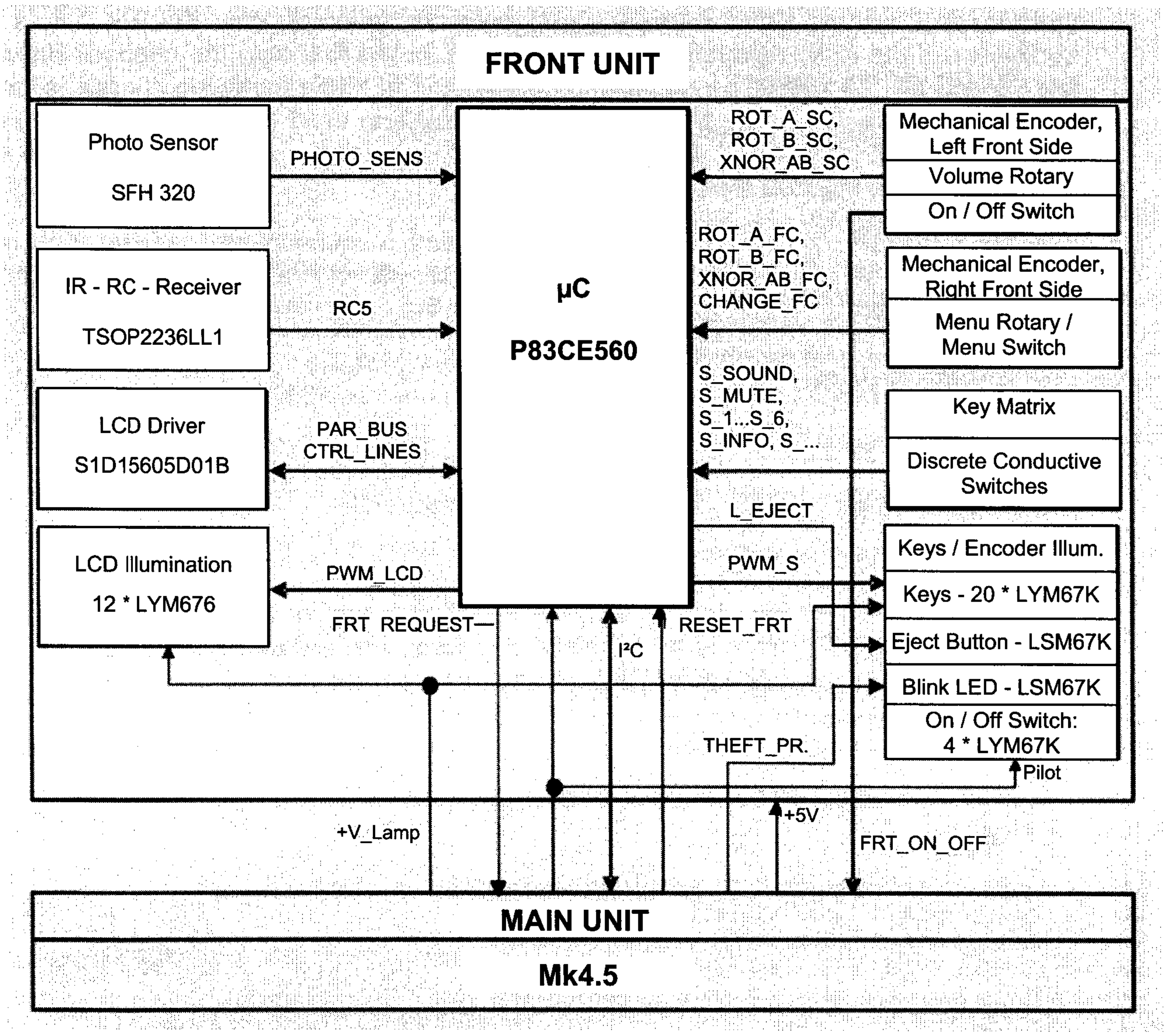
Other C-IQ Features

One has the choice of obtaining information about the current activation status. Together with the map and travel information software also the opportunity is given to inspect different products that are free of charge before they are ordered. More information that can be displayed:

- C-IQ settings.
- C-IQ info.
- C-IQ Service; in the case a mobile phone (GMS) is present, the C-IQ Service desk can be called automatically using the set.

MS4150RS / NAV-R45 FRONT UNIT TECHNICAL DESCRIPTION

Block Diagram


FRONT UNIT
Photo Sensor
SFH 320
PHOTO_SENS
IR - RC - Receiver
TSOP2236LL1
RC5
LCD Driver
S1D15605D01B
PAR_BUS
CTRL_LINES
LCD Illumination
12 * LYM676
PWM_LCD
FRT_REQUEST
µC
P83CE560
ROT_A_SC,
ROT_B_SC,
XNOR_AB_SC
Mechanical Encoder, Left Front Side
Volume Rotary
On / Off Switch
ROT_A_FC,
ROT_B_FC,
XNOR_AB_FC,
CHANGE_FC
Mechanical Encoder, Right Front Side
Menu Rotary / Menu Switch
S_SOUND,
S_MUTE,
S_1...S_6,
S_INFO, S_...
Key Matrix
Discrete Conductive Switches
L_EJECT
PWM_S
Keys / Encoder Illum.
Keys - 20 * LYM67K
RESET_FRT
Eject Button - LSM67K
I²C
Blink LED - LSM67K
THEFT_PR.
On / Off Switch: 4 * LYM67K
Pilot
+5V
+V_Lamp
FRT_ON_OFF
MAIN UNIT
Mk4.5

Block Diagram Description

General

The front unit uses a monochrome display. Furthermore, it contains 6 preset buttons, 10 general push buttons, 2 rotary encoders and LED illumination. The front unit should be used together with the Mk4.5 main (base) unit. For the description of that unit, refer to the part concerned elsewhere in this manual.
The front unit is connected to the main unit via a 19-pole non-twisted flex-foil cable. Therefore, pin 1 of the 19-pole main connector corresponds with pin 19 of the 19-pole front unit connector. For the connector layouts, refer to the parts concerned.

Mk4.5 Base Unit Interfaces

FRONT_REQ:	This signal is an input to the C161. It is used by the front unit to inform the C161 when the front wants to connect to, communicate with or disconnect itself from the C161. The signal pin concerned should be low during power-down mode. This signal is connected to the FRONT_INT signal of the main (base unit).
FRT_DETACH:	This signal is an output to the OLIC of the power supply and it is active low. It informs if the MS4200RS/00-/01 front is detached. In the MS4150RS/00/01- and NAV-R45 front units this

signal is NOT used. In these front units, this signal is pulled down to ground. The pull-up resistor is located in the Mk4.5 base unit.

FRT_EJECT: This signal is an output to the OLIC of the power supply and it is active low. It informs about the status of the "EJECT" button (High = Button not pressed; Low = Button is pressed).

FRT_ON_OFF: This signal is an output to the OLIC of the power supply and it is active low. It informs about the status of the "ON OFF" button (High = Button not pressed; Low = Button is pressed).

PILOT: This signal informs the front unit that the vehicle lights are switched on. The pilot illumination is on under the following conditions: vehicle lights switched on, on/off switch is off or ignition is switched off. This signal is also used as supply voltage for the pilot light when the +5V front supply voltage is off.

RESET_FRONT: This signal is an input from the C161. It is active high, used to reset the P83CE560 of the front (must be a low level in power down mode).

THEFT_PROTEC: This signal supplies a blink signal for the theft protection LED when the Mk4.5 unit is switched off.
This signal gives one 20ms pulse every one second.

Bus Interface

SCL_FRONT: This signal is an input from the main unit µP C161CS (master processor - externally pulled up by a 4.7kΩ resistor). It is a clock line of the software I²C bus which connects together the front µP P83CE560 (slave processor here) and the C161CS.
The signal must be in low level in power down mode.

SDA_FRONT: This signal is an input/output from/to the main unit µP C161CS (master processor - externally pulled up by a 4.7kΩ resistor). It is a data line of the software I²C bus which connects together the front µP P83CE560 (slave processor here) and the C161CS.
The signal must be in low level in power down mode.

RC5 Interface (Assembly Option)

The RC5 interface module consists of: infrared receiver, a resistor and a capacitor. The infrared receiver is used to convert the IR signal to an electrical signal in accordance with the RC5 standard.
The IR receiver in its turn consists of: a photo diode, pre-amplifier, AGC, band-pass filter and demodulator. The output signal is connected to the front µP P83CE560. The µP decodes the RC5 signal and converts it into I²C frame signals. Via the front I²C bus the I²C frames are sent to the main µP C161CS and that µP processes the I²C frames to appropriate control signals.

Hereafter the RC5 receiver H/W specifications follow:

Parameter	Value
High level output	>2.5V @ 10mA
Low level output	<0.5V @ 1mA
Carrier frequency	36.0kHz
Rise time	<1µsec
Fall time	<1µsec

Rotary Encoders

Two rotary encoders (each of different type) are used: one for the volume / power on/off function whereas the other one is used for the menu / confirm OK function.

Display Interface

A0: This signal controls the control / display data selection input of the S1D15605D01B selector. When A0 = high, then the data bus D0-D7 is used as display data bus whereas D0-D7 are used as control data bus when A0 = low.

/CS1: This signal is used to select the LCD module. When low (active status), then the LCD chip selection becomes active and the data / command I/O is enabled.

D0 - D7: These lines form an 8-bit bi-directional data bus between the S1D15605D01B and the µP P83CE560.
D7 is the MSB whereas D0 is the LSB.

E:	This signal is active high and it enables the S1D15605D01B selector for reading / writing when this signal is high.
/RES:	This signal is an active low output signal from the µP P83CE560. It is used to reset the LCD module. To initialize the settings, it is put to low.
R / W:	This signal determinates whether there data must be either read or written to / from the S1D15605D01B selector. When this signal is high, then data is read by this selector whereas data is written to the selector when this signal is low.

Photo Sensor Interface

To control the intensity of the display and button illumination, a photo sensor is used to measure the average ambient light level and to convert it into an electrical value. The photo sensor interface consists of: a photo transistor and an ADC inside the µP P83CE560. The analogue output of the photo transistor is converted into a digital value for both PWM (Pulse Width Modulation) drivers (PWM_LCD - for the display; PWM_S - for the buttons).

Hereafter the specifications of the photo sensor follows:

Parameter	Value
Collector-Emitter saturation voltage	150mV
Rise / Fall time @ I_C=1mA, V_{CC}=5V	7µsec
Spectral range of sensitivity λ	380...1150nm
Half angle φ	±60°
Dark current I_{CEO} @ U_{CE}=25V, E=0	1 (typ.) / ≤ 200nA
Photo current I_{PCE} @ E_E=0.1mW/cm²	25...50µA (@ U_{CE}=5V)
Photo current I_{PCE} @ E_V=1000lx	650µA (@ U_{CE}=5V / standard light intensity)

Front ON / OFF Logic Behaviour

From the user's point of view there are only two states: ON and OFF.
From an electrical point of view there are mainly three different ON/OFF states for the front unit:

- The 'Stand-By' Mode for which the main - and front units have their minimum current consumption. It corresponds to navigation part OFF, and radio part in power down mode. The front is switched off because the front µP is held in reset mode or the supply voltage +5V(+4) is OFF. The main - and front units are completely OFF.
- The 'Degraded' Mode for which the set mutes the audio and user interface (MMI) is OFF. The radio, navigation and front µP are running, and the internal switched power supplies are ON (the SET_ON signal is '1'). This implies the front unit supply voltage +5V(+4) is ON.
  The front is NOT illuminated because the supply voltages of the LED's (+V_LAMP) is switched off.
- The 'Running' Mode for which the main - and front units have their maximum of current consumption. It corresponds basically to the state where all devices could be active.

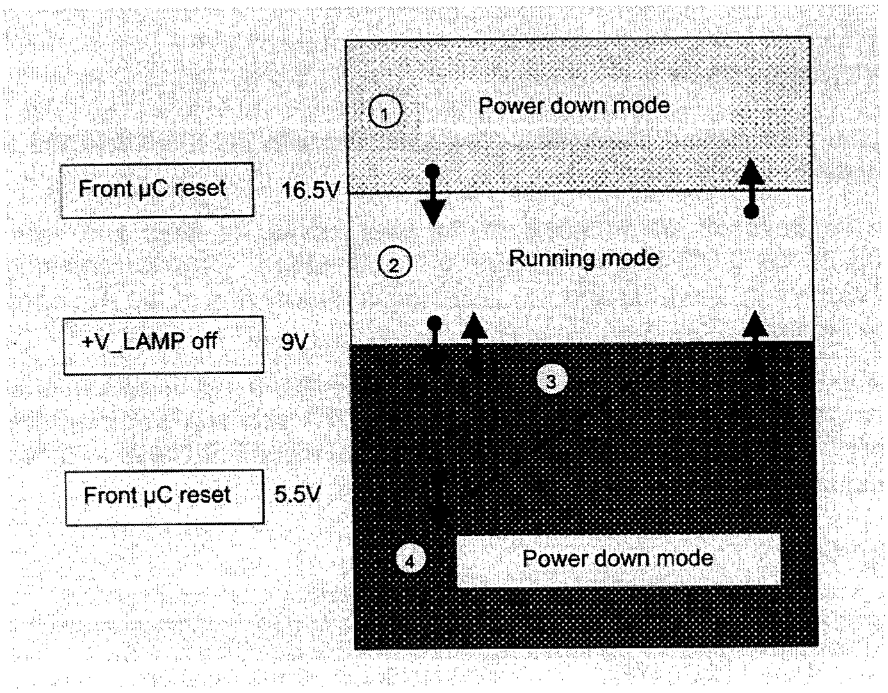
Currents of On/Off conditions

Mode	Conditions	Min.	Typ.	Max.	Unit
Stand-By	The front is powered down Same @ with PILOT light on	- -	1.5	0.1 40	mA
Degraded	Front µP running, MMI & illum. OFF, PILOT light off Same @ with PILOT light on	- -	40 44	150 160	mA
Running	Front operates	-	200	510	mA

Main - front unit interface power supply specifications:

Supply Voltage	Current Consumption
+5V(+4) (+5V front unit supply voltage)	≤ 150mA
+V_LAMP (+10.3V LED supply voltage - except for PILOT and EJECT LED)	≤ 350mA
PILOT (+5V left rotary button LED illumination)	≤ 40mA

The front power supply functional graph is given at the next page.



Front Microprocessor P83CE560

The main tasks of the front microprocessor are: to control all front-related processes, to communicate with the main unit and to process the information coming from the main unit. The microprocessor handles the inputs given by the user via the keys and rotary encoders, it controls the LCD unit to display information and it processes the IR sensor - and photo sensor information to generate the PWM signals.

The table hereafter gives a description of all pins (/... = signal concerned is active low; N.C. = not connected):

Pin	Name	Active	Direction	Signal Name	Signal Description
1	AVREF-	-	-	Ground	0V
2	AVREF+	-	-	+5V(+4)	+5V supply voltage
3	AVSS	-	-	Ground	0V
4	AVDD1	-	-	+5V(+4)	+5V supply voltage
5	P5.7	Low	In	S_1	Preset key 1
6	P5.6	Low	In	S_2	Preset key 2
7	P5.5	Low	In	S_3	Preset key 3
8	P5.4	Low	In	S_4	Preset key 4
9	P5.3	Low	In	CHANGE_FC	OK key of Menu rotary encoder
10	P5.2	Low	In	S_REP	Repeat key
11	P5.1	Low	In	S_NAV	Navigation key
12	ADC0 (P5.0)	-	In	PHOTO_SENS	Photo sensor input
13	VSS1	-	-	Ground	0V
14	VDD1	-	-	+5V(+4)	+5V supply voltage
15	ADEXS	-	-	Ground	0V
16	/PWM0	-	Out	PWM_LCD	PWM control signal for LCD
17	/PWM1	-	Out	PWM_S	PWM control signal for LED's
18	EW	-	-	Ground	0V
19	P4.0	-	Out	D0	S1D15605D01B data bus bit0 (LSB)
20	P4.1	-	Out	D1	S1D15605D01B data bus bit1
21	P4.2	-	Out	D2	S1D15605D01B data bus bit2
22	P4.3	-	Out	D3	S1D15605D01B data bus bit3
23	RSTOUT	-	-	N.C.	Not used
24	P4.4	-	Out	D4	S1D15605D01B data bus bit4
25	P4.5	-	Out	D5	S1D15605D01B data bus bit5
26	P4.6	-	Out	D6	S1D15605D01B data bus bit6
27	P4.7	-	Out	D7	S1D15605D01B data bus bit7 (MSB)
28	VDD2	-	-	+5V(+4)	+5V supply voltage
29	VSS2	-	-	Ground	0V
30	RSTIN	High	In	RESET_FRT	Reset from main unit (enabled through MMI)
31	P1.0	Edge	Interrupt	XNOR_AB_SC	Volume rotary encoder request
32	P1.1	Edge	Interrupt	ROT_A_FC	Menu rotary encoder signal A
33	P1.2	Low	Interrupt	IR_RC5	RC5 data
34	P1.3	Low	In	TEST_CONTR_ADJUST	Black/white test picture for LCD - pulled up via 4.7kΩ
35	P1.4	-	In	ROT_A_SC	Volume rotary encoder signal A
36	P1.5	-	In	ROT_B_SC	Volume rotary encoder signal B

37	P1.6	-	-	N.C.	Not used
38	P1.7	-	In	ROT_B_FC	Menu rotary encoder signal B
39	SCL	-	I/O	SCL_FRT	Main unit - Front I^{2}C bus clock signal
40	SDA	-	I/O	SDA_FRT	Main unit - Front I^{2}C bus data signal
41	P3.0	High	In	/PILOT	Inverted Pilot illumination signal
42	P3.1	-	-	Ground	Not used - pulled down via 4.7kΩ
43	P3.2	-	-	Ground	Not used - pulled down via 4.7kΩ
44	P3.3	Low	Out	L_EJECT	Eject key LED illumination
45	P3.4	-	-	N.C.	Not used
46	P3.5	-	-	N.C.	Not used
47	P3.6	Low	In	TEST_T1_T3	Test for T1 and T3 - pulled up via 4.7kΩ
48	P3.7	-	-	N.C.	Not used
49	NC1	-	-	N.C.	Not used
50	NC2	-	-	N.C.	Not used
51	XTAL2	-	In	16M_CSTCV	16MHz crystal clock input
52	XTAL1	-	In	16M_CSTCV	16MHz crystal clock input
53	VDD3	-	-	+5V(+4)	+5V supply voltage
54	VSS3	-	-	Ground	0V
55	P2.0	Low	Out	/RES	Reset signal for S1D15605D01B
56	P2.1	Low	Out	/CS1	Chip select signal for S1D15605D01B
57	P2.2	-	Out	A0	Control data / display data selection line
58	P2.3	-	Out	R / W	S1D15605D01B Read / Write operation
59	P2.4	High	Out	E	Enable S1D15605D01B chip
60	P2.5	Low	In	S_5	Preset key 5
61	P2.6	Low	In	S_6	Preset key 6
62	P2.7	Low	Out	FRT_REQUEST	Front request (interrupt)
63	PSEN	-	-	N.C.	Not used
64	ALE	-	-	N.C.	Not used
65	EA	-	-	+5V(+4)	+5V supply voltage (unfiltered)
66	VDD4	-	-	+5V(+4)	+5V supply voltage
67	VSS4	-	-	Ground	0V
68	P0.7	Low	In	S_CLEAR	Clear key
69	P0.6	Low	In	S_CDC	CD changer key
70	P0.5	Low	In	S_MENU	Menu key
71	P0.4	Low	In	S_RADIO	Radio key
72	P0.3	Low	In	S_ALT_R	Alternative route key
73	P0.2	Low	In	S_INFO	Info key
74	P0.1	Low	In	S_MUTE	Mute key
75	P0.0	Low	In	S_SOUND	Sound key
76	AVDD2	-	-	+5V(+4)	+5V supply voltage
77	AVSS2	-	-	Ground	0V
78	XTAL3	-	-	N.C.	Not used
79	XTAL4	-	-	Ground	0V
80	SELXTAL1	-	In	+5V(+4)	Connected to +5V supply

Illumination

For illumination of the LCD and keys, LED's are used; 12 to illuminate the LCD panel, 16 for the front keys, 2 for the Menu / OK rotary encoder, 2 for the Volume / On/Off rotary encoder, 1 for the Eject button (at the back of the front) and 1 for theft protection (blinking).
The LCD illumination LED's are fed with the +V_LAMP voltage (typ. value 10.3VDC) when the power on/off button is switched on. The maximum current is limited to 30mA to prevent damage of the LED's. As stated before in this chapter, the LED light intensity is determined by the PWM_LCD signal, dependent on the ambient light level.
The following 16 keys are illuminated by a LED: Mute, Radio, CDC, Sound, Info, Preset 1...6, Navigation, Clear, Repeat, Menu and 'Alternative Route'.
Two LED's are used to illuminate the Menu / OK rotary encoder, at the front right side.
The key illumination LED's are fed with the +V_LAMP voltage (typ. value 10.3VDC) when the power on/off button is switched on. The maximum current is limited to 15mA to prevent damage of the LED's. As stated before in this chapter, the LED light intensity is determined by the PWM_S signal, dependent on the ambient light level.
Two LED's are used to illuminate the Volume / On/Off rotary encoder, at the front left side. Two different modes are used:

- Switched-On illumination mode: This mode is used after switching on the power on/off button. As supply voltage the +5V(+4) supply is used. The LED's are driven by the PWM_S, dependent on the ambient light intensity.
- Pilot illumination mode: This mode is used when: the vehicle lights are on and the power on/off button is switched off or the ignition key is switched off. The LED's are supplied in two ways:
  - If the Mk4.5 system is in 'degraded' mode (refer to the section concerned), the pilot LED's are supplied by

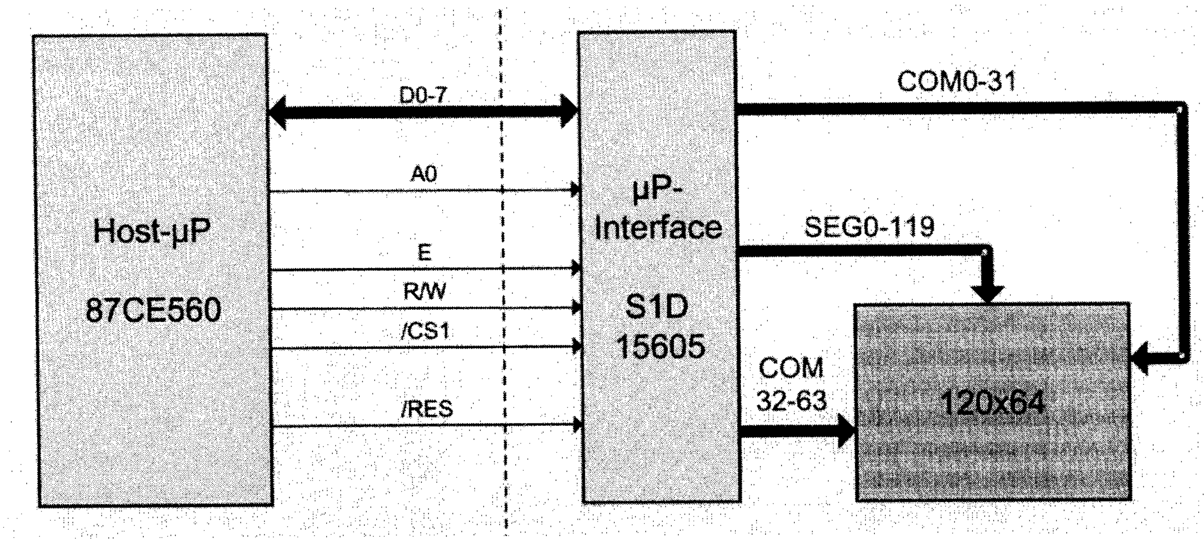
+5V(+4) supply and the PWM's are operating. This situation actually equal to the 'switch-on illumination mode'.
- If the system is in 'stand-by' mode (refer to the section concerned), the pilot LED's are supplied from the pilot signal itself. Because the +5V(+4) supply is off, also the PWM's are off. The total current is limited to 40mA to prevent damage of the LED's.

The 'Eject' button is illuminated by one low-current LED which uses the +5V(+4) supply. The LED is driven by the L_EJECT signal only in the case when the flap is put down. The current is limited to 15mA.
Finally, the theft protection LED (blinking) flashes every second for a duration of 20msec. The LED is driven by the THEFT_PROTECTION signal.

Display Unit

The display unit consists of the following components: µP interface / display driver S1D15605d01B and a liquid crystal matrix of 120x64 pixels. The following busses are used between the driver and the liquid crystal display:
- COM0-31
- COM32-64
- SEG0-119

With help of these busses it is possible to control each pixel.
The figure below shows the simplified block diagram of the display unit and how it is connected to the front µP P83CE560.



MS4150RS / NAV-R45 Front Unit Connectors

Main PCB Interface Connector

Connector 1901			
Pin	**I/O**	**Signal**	**Comments**
1	I	$+U_{Lamp}$	Power supply for front illumination (LED's)
2	I	Bezel_LCD	Ground line connected to LCD bezel housing
3	I	Theft_Protec	Supply for theft protection blinking LED
4	I	Ground	0V
5	I	$+U_{Lamp}$	Power supply for front illumination (LED's)
6	I	$+U_{Lamp}$	Power supply for front illumination (LED's)
7	I	Ground	0V
8	O	Front_Detach	Informs Mk4.5 base - front is detached
9	O	Front_Eject	Informs Mk4.5 base - eject button is pressed
10	O	Front_ON / OFF	Informs Mk4.5 base - on/off button pressed
11	O	Front_(Interrupt_)Request	Interrupt / Request from front to Mk4.5 base
12	I	Ground	0V
13	I	+5V([+4])	Switched +5V supply voltage
14	I/O	SCL_Front	Clock line of I^{2}C bus between front / Mk4.5
15	I	Ground	0V
16	I/O	SDA_Front	Data line of I^{2}C bus between front / Mk4.5
17	I	Bezel_Rot	Ground line connected to switch housings
18	I	Pilot Light	Informs the front unit - vehicle lights are on
19	I	Reset Front	Resets the front unit microprocessor

LCD Module Connector

Connector 1903			
Pin	**I/O**	**Signal**	**Comments**
1	O	/CS1 (/ = active low)	Chip select signal for LCD module
2	O	/RES (/ = active low)	Reset signal for LCD module
3	O	A0	Control data / display data selection input of S1D15605D01B; High = Display data; Low = Control data
4	O	R / W	Read / write signal for LCD module; High = Read mode; Low = Write mode
5	O	E	Enable signal for LCD module; Read / write operation initiated when high
6	I/O	D0	8-bit bidirectional data bus bit 0 (LSB)
7	I/O	D1	8-bit bidirectional data bus bit 1
8	I/O	D2	8-bit bidirectional data bus bit 2
9	I/O	D3	8-bit bidirectional data bus bit 3
10	I/O	D4	8-bit bidirectional data bus bit 4
11	I/O	D5	8-bit bidirectional data bus bit 5
12	I/O	D6 (SCK)	8-bit bidirectional data bus bit 6
13	I/O	D7 (SDA)	8-bit bidirectional data bus bit 7 (MSB)
14	O	V_{DD}	+5V logic supply voltage for LCD module
15	O	V_{SS}	0V (GND) for LCD module
16	I	V_{OUT}	Capacitor connection between this pin and GND
17	I	CAP3-	Capacitor connection between this pin and CAP1+
18	I	CAP1+	Capacitor connection between this pin and CAP1-
19	I	CAP1-	Capacitor connection between this pin and CAP1+
20	I	CAP2-	Capacitor connection between this pin and CAP2+
21	I	CAP2+	Capacitor connection between this pin and CAP2-
22	I	V1	Multi-level power supply for LCD - $V_{DD} \geq V1$
23	I	V2	Multi-level power supply for LCD - $V1 \geq V2$
24	I	V3	Multi-level power supply for LCD - $V2 \geq V3$
25	I	V4	Multi-level power supply for LCD - $V3 \geq V4$
26	I	V5	Multi-level power supply for LCD - $V4 \geq V5$
27	I	V_R	Output voltage regulator terminal for LCD

Flap-Down Switch (Connector)

Connector 1902			
Pin	**I/O**	**Signal**	**Comments**
1	O	FLAP_DOWN	Informs the Mk4.5 base unit that the flap is open (down); High = Front is closed / up; Low = Front is opened / down
2	-	GND	Power ground (0V)

MS4150RS / NAV-R45 Front Checks

The following checks should be done first when the front unit is suspected to be defective:

Current Consumption

Pilot Light	+5V	$+U_{Lamp}$
<40mA	<50 mA	<350 mA

Voltage Supply

Component	Ref. (Pos.)	Test Point	Min.	Typ.	Max.
µP P83CES60 (pin 14)	7904	I164	4.6V	5V	5.4V
Daylight Sensor SFH320-3	7902	I165	4.6V	5V	5.4V
IR Sensor TSOP2237LL1	6900	I166	4.6V	5V	5.4V
NOR Gates HEF-4077	7900	I167	4.6V	5V	5.4V

Reference Oscillator Frequencies

Devices	Ref. (Pos.)	Test Point	83CE560 - pin 51 / 52
Frequency	7904	I168 and I169	16 MHz ± 0.5%

Button Function

For checking the maximum luminance of the buttons, the daylight sensor should also be illuminated as done for the display brightness measuring.

The brightness of the buttons (text field) should have 3-5 Cd/m^2.

Performance check of the LCD

Set the front in test mode by pressing the BAND, 🗣))) and POWER keys simultaneously. By pressing the CD key, you make appear in sequence one of the 7 different frames on the display in the following order:
- Border / Frame LCD
- Full LCD
- Blank LCD
- Chessboard pattern 1
- Chessboard pattern 2 (reversed pattern w.r.t. pattern 1)
- Screen with lines
- Screen half blank, half full

The screen border LCD shows the performance of the LCD. This screen is a strong load for the driver IC. Service people should check that the display has no crosstalk or some bad homogeneities.

Here a short explanation follows of all test screens:

- The screen - *Full LCD* - shows a full screen with all pixels on. This screen shows faulty pixels as black pixels.
- The screen - *Blank LCD* - shows a full black screen with all pixels off. This screen shows faulty pixels as lit pixels.
- The screen - *Chessboard 1* - shows a screen alternating one pixel on and one pixel off. This screen shows faulty pixels as a disturbed chessboard pattern.
- The screen - *Chessboard 2* - shows a screen alternating one pixel off one pixel on (reversed pattern 1). This screen shows faulty pixels as a disturbed chessboard pattern.
- The screen *with lines* shows the performance of the LCD. This screen is a strongly load for the driver IC, so don't use this screen test mode too long time.
  The service technician should check that the display has no crosstalk or some bad homogeneities.
- The screen *half blank and half full* should be used for contrast measuring.

MS4200RS VERSION

General

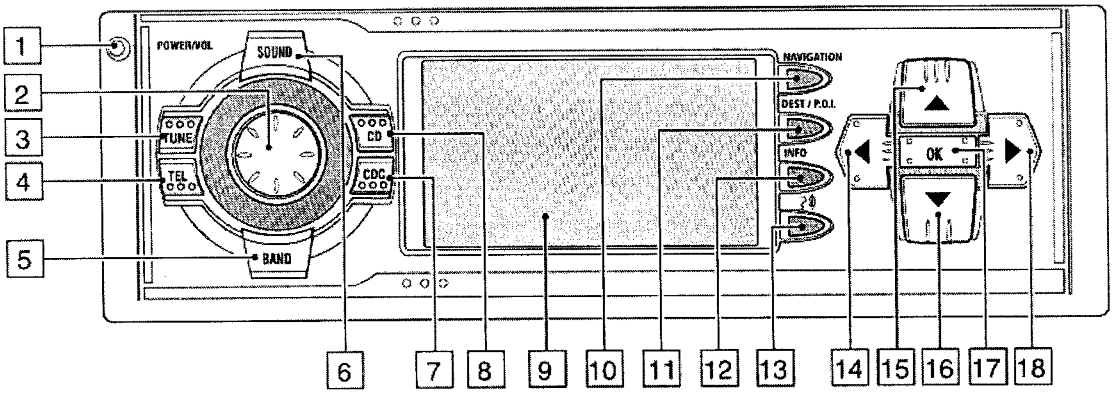
The MS4200RS front unit has two versions:
- -/00 version: silver/chrome coloured front base / buttons with black or red inscriptions.
- -/01 version: black coloured front base / buttons with white or red inscriptions.

Both versions have a display with a white background illumination and blue/red button illumination.
Unless otherwise noted, the description hereafter is valid for both versions.

Front Unit Controls

Controls / Button Overview

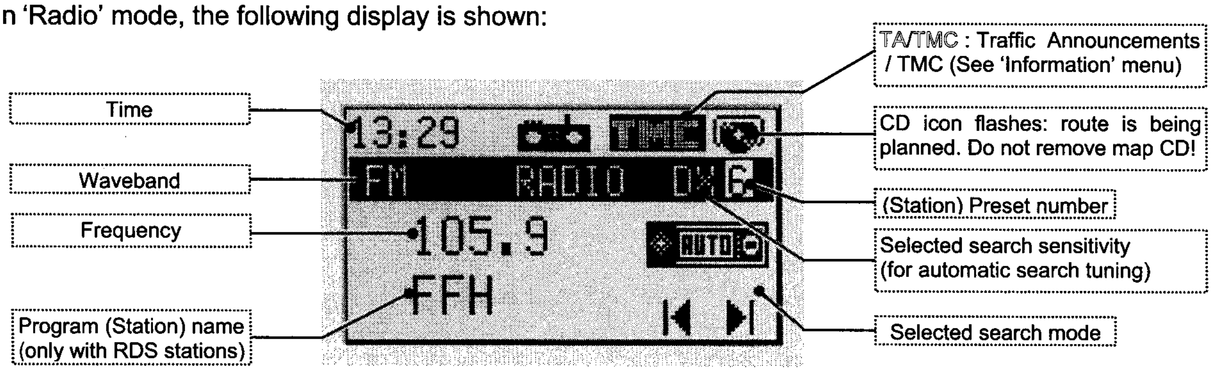
The next figure shows the layout of the MS4200RS front. An explanation of each button is given also.



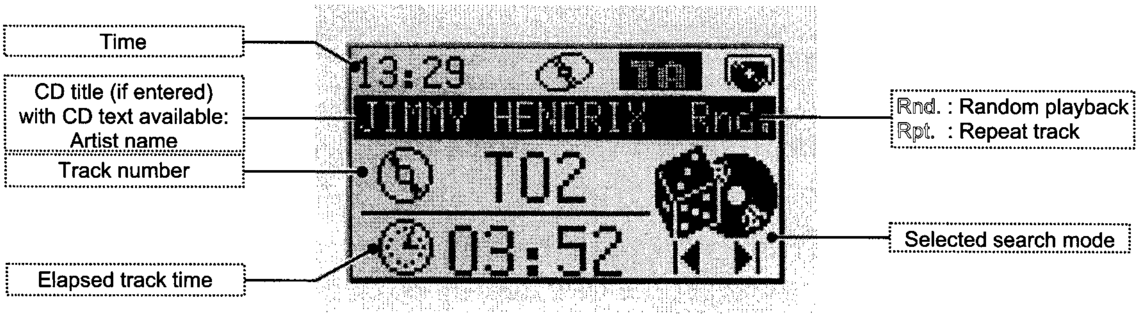
1	**REL**	Release button for removable control panel.
2	**POWER/VOLUME**	Press to switch on/off; turn to adjust the volume.
3	**TUNE**	Switch to 'Radio' mode (if not in 'Radio' mode yet). Invokes the 'Radio' menu (if in 'Radio' mode).
4	**TEL**	With mobile phone (GSM) connected: Switch to telephone input; Without mobile phone (GSM) connected: Mutes the system audio.
5	**BAND**	Invokes the 'Band Selection' menu (if the set is in 'Radio' mode).
6	**SOUND**	Invokes the 'Sound' menu. See for a description elsewhere in this manual.
7	**CDC**	Switch to 'CD changer' mode (if one is connected) (if not in 'CDC' mode yet). Invokes the 'CD changer' menu (if in 'CDC' mode).
8	**CD**	Switch to 'CD player' mode (if not in 'CD player' mode yet). Invokes the 'CD' menu (if in 'CD player' mode).
9		Display.
10	**NAVIGATION**	Enters the 'Navigation' mode and - menu.
11	**DEST / P.O.I.**	*Press once*: Opens the list of addresses stored in the address book. *Press twice in quick succession*: Opens the 'Info on car position' menu.
12	**INFO**	Invokes the 'Information' menu. See for a description elsewhere in this manual.
13	**🔊)))**	Play-back current direction and (if available) the current TMC message.
14	**◀**	Moves the cursor to the left in the menus.
15	**▲**	Moves the cursor upwards in the menus.
16	**▼**	Moves the cursor downwards in the menus.
17	**OK**	For radio, CD player and CD changer: Switch search mode type. In menus: Confirms a selection.
18	**▶**	Moves the cursor to the right in the menus.

Displays

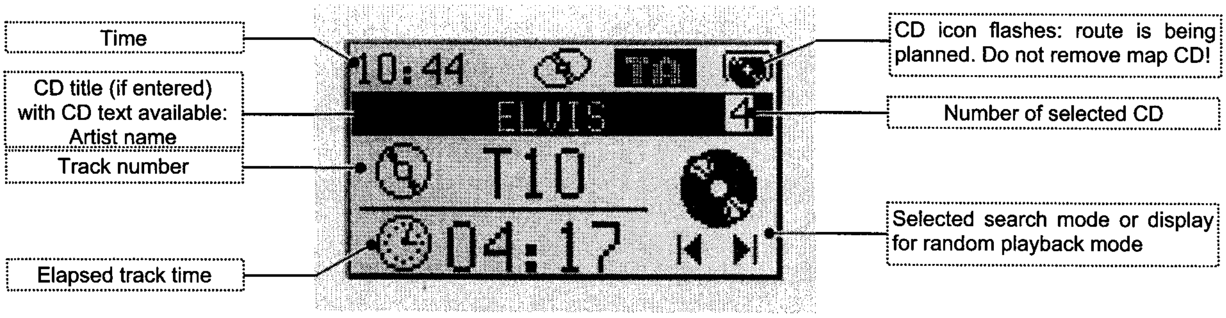
In 'Radio' mode, the following display is shown:


Time
Waveband
Frequency
Program (Station) name (only with RDS stations)
13:29
TMC
FM RADIO DX 6
105.9
AUTO
FFH
TA/TMC : Traffic Announcements / TMC (See 'Information' menu)
CD icon flashes: route is being planned. Do not remove map CD!
(Station) Preset number
Selected search sensitivity (for automatic search tuning)
Selected search mode

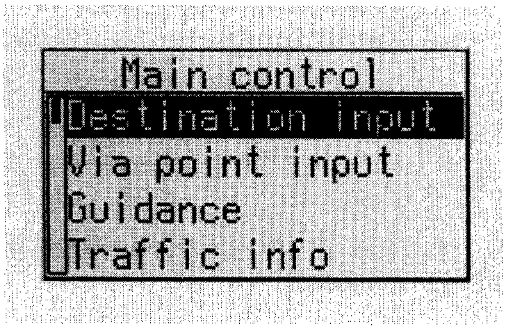
In 'CD Player' mode, the following display is shown:


Time
CD title (if entered) with CD text available: Artist name
Track number
Elapsed track time
13:29
TA
JIMMY HENDRIX Rnd
T02
03:52
Rnd. : Random playback
Rpt. : Repeat track
Selected search mode

In 'CD Changer' mode, the following display is shown:


Time
CD title (if entered) with CD text available: Artist name
Track number
Elapsed track time
10:44
TA
ELVIS 4
T10
04:17
CD icon flashes: route is being planned. Do not remove map CD!
Number of selected CD
Selected search mode or display for random playback mode

In 'Navigation' mode, the following display is shown:


Main control
Destination input
Via point input
Guidance
Traffic info

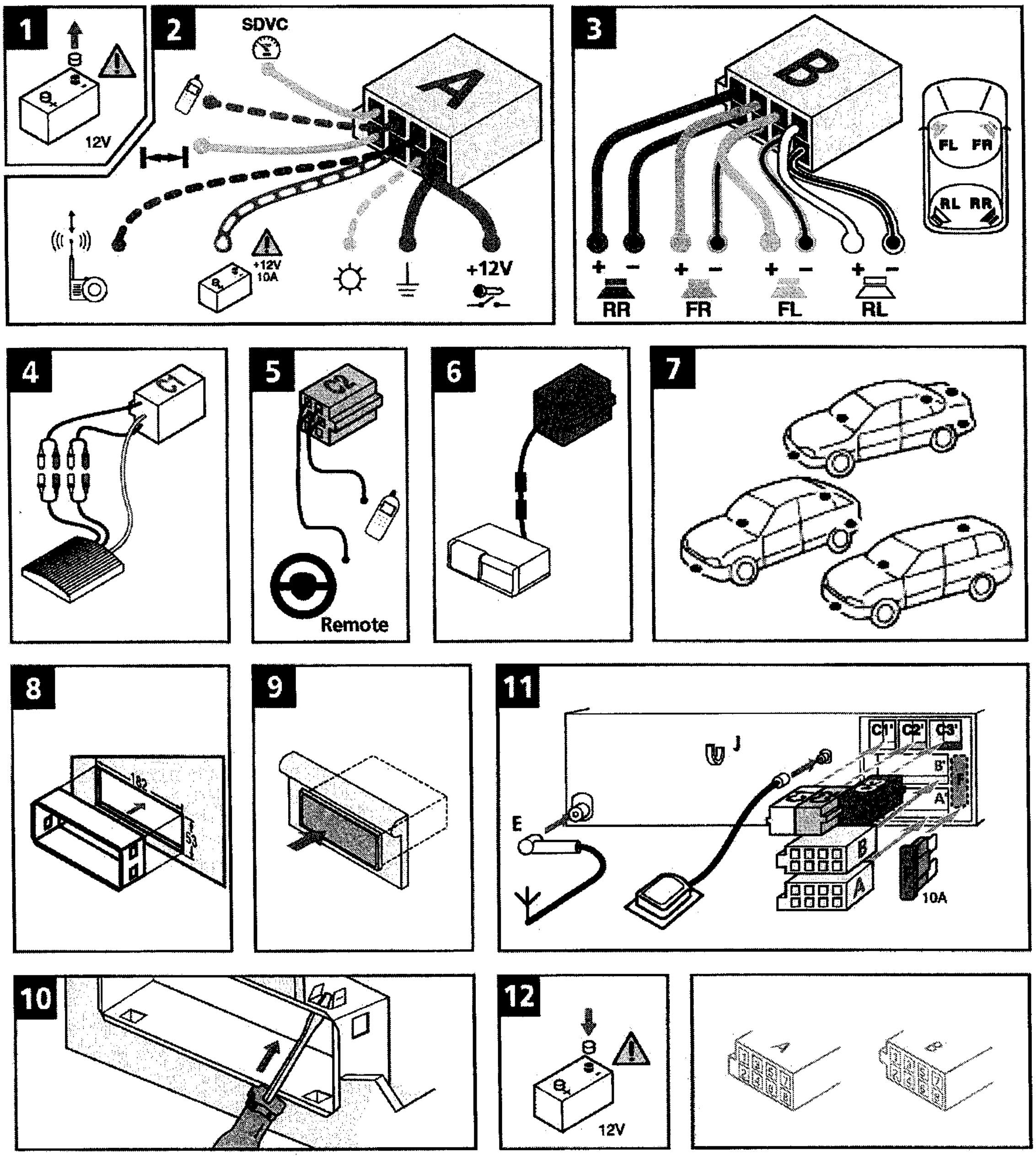
Note: All display values, parameters etc. in every figure in this chapter are examples!

By pressing one of the ◄, ▲, ▼ or ► keys, all submenus can be scrolled through and by pressing the 'OK' button the highlighted menu is selected. Refer for all possible menus to the 'Operation' part of this chapter.

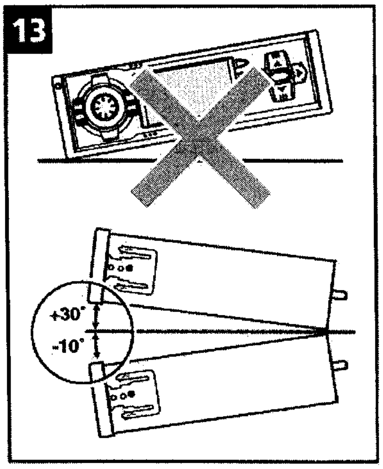
Installation

Installation Chart

The chart below shows how all car equipment should be connected. A brief explanation is given for each sub-figure.


1
12V
2
SDVC
A
+12V
10A
+12V
3
B
FL
FR
RL
RR
+ −
+ −
+ −
+ −
RR
FR
FL
RL
4
C1
5
C2
Remote
6
7
8
182
53
9
11
J
E
C1'
C2'
C3'
B'
A'
B
A
10A
10
12
12V
A
B

1. Disconnect the cable from the '-' battery pole.
2. Connect all car devices to block A as indicated. Refer to the section 'Connections' if necessary.
3. Connect all car loudspeakers to block B as indicated.
4. Connect the booster (if present) to block C1.
5. Connect 'Steering' wheel remote control to block C2.
6. Connect the CD changer (if present) to block C3.
7. Places where the GPS antenna can be installed.
8. How the sleeve should be mounted into the dashboard.
9. Insert the Mk4.5 set provisionally to see if there is sufficient space.
10. Bend the lips of the sleeve to fix it to the dashboard.
11. Look if all connections are made (A, B, C1/2/3, Radio - and GPS antenna) and the right fuse (10A) is present.
12. Re-connect the '- ' battery pole (earth) cable.
13. The set should be mounted horizontally (no swivel, tilt angle should be within the limits: -10°...+30°).



Operation

Initial Operation

After installing the set, a proper operation can be checked in the following way:

1. Restore complete functioning of the car electronic system.
2. Switch on the ignition key.
3. Insert a map CD into the Mk4.5 set. To register the system and activate the map -, travel and/or traffic information, refer to the sub-section 'C-IQ' elsewhere in this manual.
4. Ensure that a proper GPS signal can be received.
5. Press the 'Navigation' button and confirm the user information by pressing the 'OK' button. The main control menu appears and the Mk4.5 set starts its initialization.
6. Wait approximately 10 minutes until the GPS reception is satisfactory.

Setting the Mounting Angle

In order to ensure proper operation of the set, its 'mounting angle' setting must be adjusted in accordance with the actual mounting angle in the instrument panel or dashboard. This is achieved in the following way:

1. When the set is in 'Navigation' mode: Select the '(System) Settings' menu and thereafter select the 'Mounting angle' submenu.
2. Dependent on the actual mounting angle, set the right angle value (between -10°...+30°). Note that the set does not differentiate positive or negative angle values. Therefore, set the value to '10' for an angle of -10°.

Loudspeaker Test

To check whether all loudspeakers are connected and operate well, a loudspeaker test can be invoked by selecting the following menus: Initialization > Loudspeaker Test.

Time Zone and Clock Adjustment

To set the Mk4.5 clock to the right time, select the following menus: Initialization > Clock Settings, and select 'GPS Clock Type' and select the right time zone. If necessary, insert the right time format (12h or 24h).

Security Code

The Mk4.5 set can be protected against theft with help of a security code (4 digits). The set is disabled and cannot be used as soon it is disconnected from the battery voltage supply (e.g. in case of theft). The set can only be re-activated by entering the correct security code.

The code can either be activated, de-activated or changed. Do the following steps:

1. Select the security code submenu via: Initialization > Security Code.
2. Enter the first digit by using the cursor keys and press the 'OK' button to confirm the right digit. When a wrong digit is entered, the complete new code has to be entered.
3. Enter the next three digits in a similar way and exit the 'Security Code' menu.

Changing the security code can be done by entering 4 new random chosen digits. De-activation is done by setting all 4 digits to '0'.

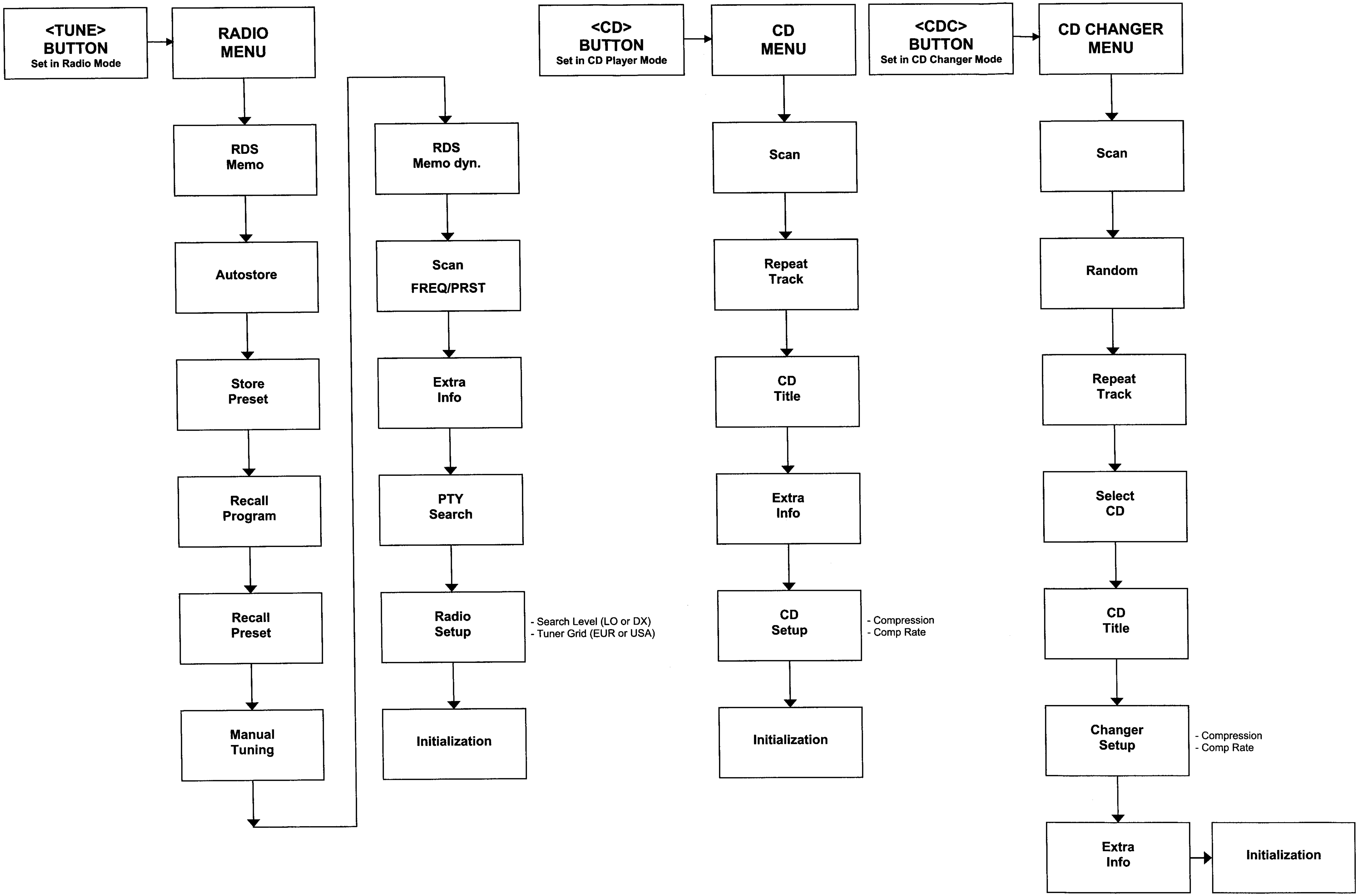
Note that the set is disabled completely after entering 10 wrong security codes. In that case, the set can only be recovered by a qualified service department.

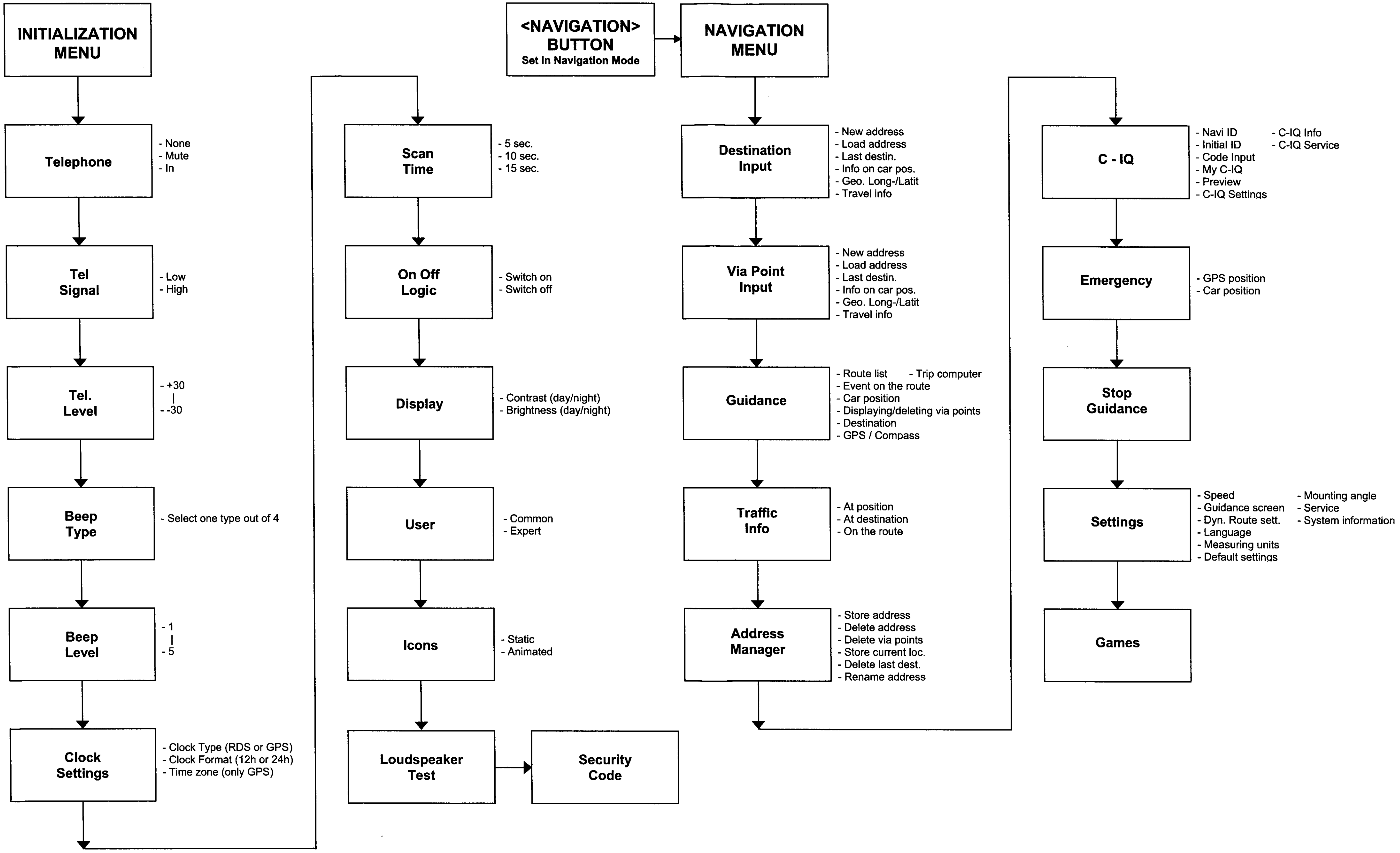
Anti-Theft Protection LED

When the set is switched off and when the ignition key is removed, then the anti-theft protection LED blinks. Note that this LED flashes only when the security code is enabled (see before).

Menu Operation

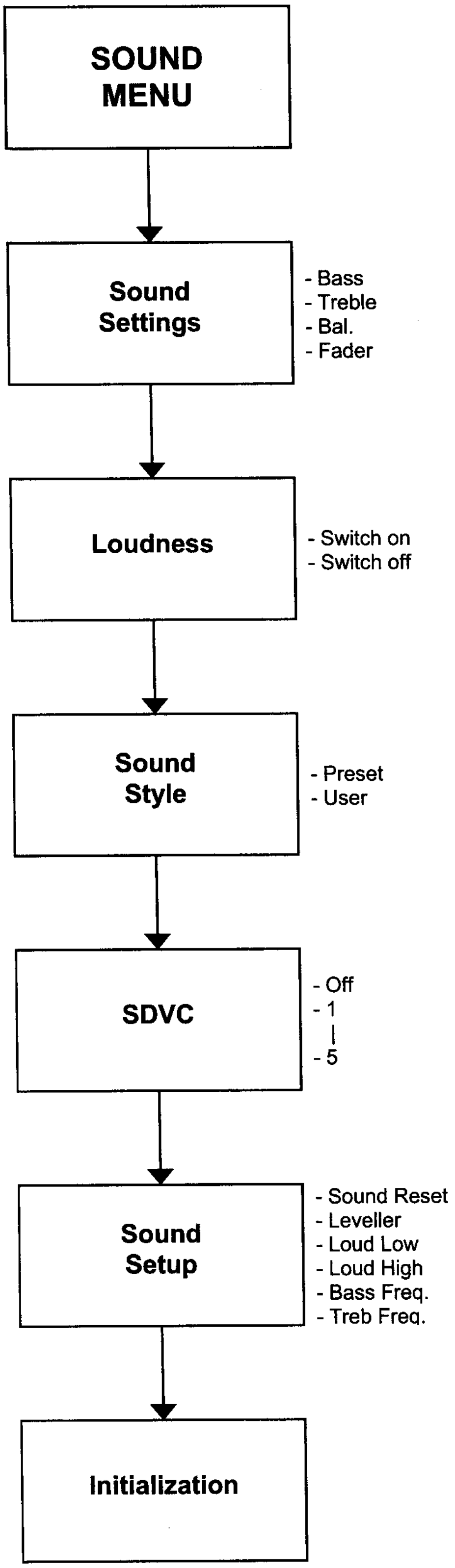
Press one of resp. the 'Tune'-, 'CD'-, 'CDC'- or 'Navigation' buttons once or twice to enter one of the following menus (dependent on the current operation mode of the set): Radio, CD, CD changer, Navigation. The next pages show the complete menu overview with their parameters as far as applicable.

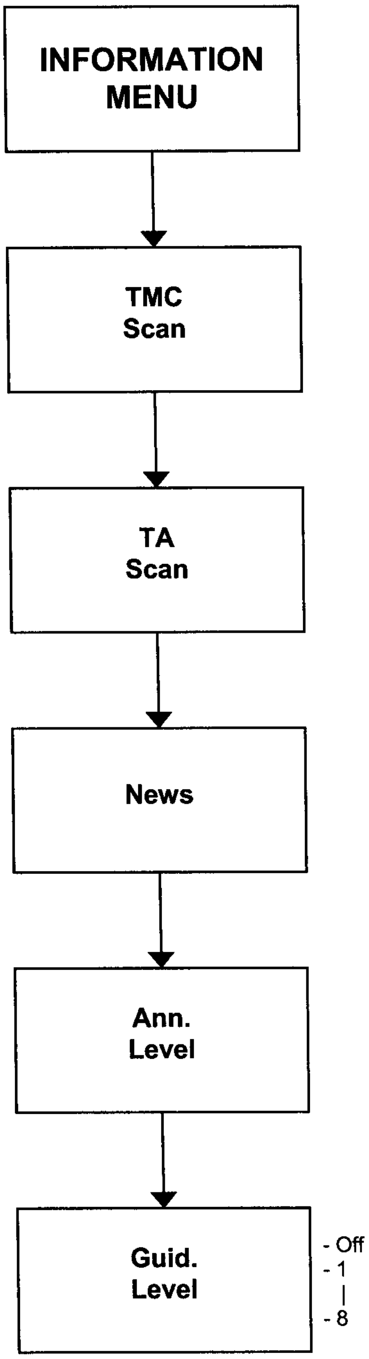

<TUNE> BUTTON
Set in Radio Mode
RADIO MENU
RDS Memo
Autostore
Store Preset
Recall Program
Recall Preset
Manual Tuning
RDS Memo dyn.
Scan FREQ/PRST
Extra Info
PTY Search
Radio Setup
- Search Level (LO or DX)
- Tuner Grid (EUR or USA)
Initialization
<CD> BUTTON
Set in CD Player Mode
CD MENU
Scan
Repeat Track
CD Title
Extra Info
CD Setup
- Compression
- Comp Rate
Initialization
<CDC> BUTTON
Set in CD Changer Mode
CD CHANGER MENU
Scan
Random
Repeat Track
Select CD
CD Title
Changer Setup
- Compression
- Comp Rate
Extra Info
Initialization


INITIALIZATION MENU
Telephone
- None
- Mute
- In
Tel Signal
- Low
- High
Tel. Level
- +30
|
- -30
Beep Type
- Select one type out of 4
Beep Level
- 1
|
- 5
Clock Settings
- Clock Type (RDS or GPS)
- Clock Format (12h or 24h)
- Time zone (only GPS)
Scan Time
- 5 sec.
- 10 sec.
- 15 sec.
On Off Logic
- Switch on
- Switch off
Display
- Contrast (day/night)
- Brightness (day/night)
User
- Common
- Expert
Icons
- Static
- Animated
Loudspeaker Test
Security Code
<NAVIGATION> BUTTON
Set in Navigation Mode
NAVIGATION MENU
Destination Input
- New address
- Load address
- Last destin.
- Info on car pos.
- Geo. Long-/Latit
- Travel info
Via Point Input
- New address
- Load address
- Last destin.
- Info on car pos.
- Geo. Long-/Latit
- Travel info
Guidance
- Route list
- Trip computer
- Event on the route
- Car position
- Displaying/deleting via points
- Destination
- GPS / Compass
Traffic Info
- At position
- At destination
- On the route
Address Manager
- Store address
- Delete address
- Delete via points
- Store current loc.
- Delete last dest.
- Rename address
C - IQ
- Navi ID
- Initial ID
- Code Input
- My C-IQ
- Preview
- C-IQ Settings
- C-IQ Info
- C-IQ Service
Emergency
- GPS position
- Car position
Stop Guidance
Settings
- Speed
- Guidance screen
- Dyn. Route sett.
- Language
- Measuring units
- Default settings
- Mounting angle
- Service
- System information
Games

Sound Menu / Information Menu

These menus are invoked by pressing the 'Sound' resp. the 'Info' button. The complete menu overview is shown together with their parameters as far as applicable.


SOUND MENU
Sound Settings
- Bass
- Treble
- Bal.
- Fader
Loudness
- Switch on
- Switch off
Sound Style
- Preset
- User
SDVC
- Off
- 1
|
- 5
Sound Setup
- Sound Reset
- Leveller
- Loud Low
- Loud High
- Bass Freq.
- Treb Freq.
Initialization


INFORMATION MENU
TMC Scan
TA Scan
News
Ann. Level
Guid. Level
- Off
- 1
|
- 8

Radio Operation

- Press the 'Tune' button (when the set was in an other operation mode yet).
- Press the 'Band' button to select a waveband.
- Now stations can be selected either automatically or manually. In the first case one can search for the strongest stations, those which send traffic announcement messages, and those which send traffic information by TMC. On the other hand, it is also possible to scan each station that can be recepted.
  In the second case, the frequency can be selected manually by pressing either the '◄'- or '►' button until the desired frequency is being reached.
- RDS stations can be recalled by using the 'Recall RDS stations by name' search mode. Selecting the desired search mode is achieved by pressing the 'OK' button one or more times.
- Preset stations (max. 30) can be stored by selecting the 'Store Preset' function and following the menu instructions.
  (*Note*: this is not possible for the FM AS and MW AS wavebands, as these bands are reserved for the 'Auto-Store' function.)
- A stored (preset) station can be restored easily by selecting the right waveband first and invoking the 'Recall Preset' menu thereafter.
- To scan a waveband, use the 'FREQ/PRST' function menu; with this function either the frequency wave band or the preset stations are scanned. When the desired station is heard, press the 'OK' button.
- Detailed radio settings and - parameters can be invoked by using the 'Radio' menu.

CD Player / CD Changer Operation

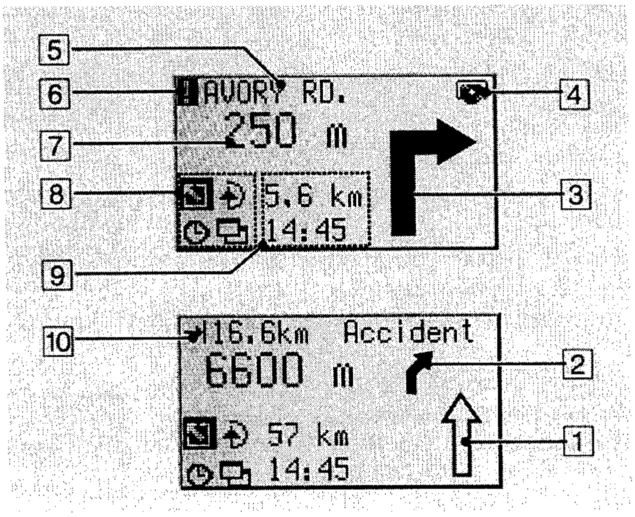
- Press the 'CDC' button; the display shows 'CD PLAYER'.
- When a CD was still in, playback is resumed at the last played track.
- Press the 'OK' button to select the desired CD play function; press either the '◄'- or '►' button to execute the function.
- (*Only for CD changer operation*): Use the 'CD select' submenu and the cursor buttons to select the desired CD in the changer out of six.
- Dependent on what one desires, there can be jumped to the right track (previous/next), each track can be scanned one by one or the tracks can be played in an random order.
- Press the 'OK' button to stop the fast search / scan function.
- Press it again to return to the 'skip track' function.
- During manual search, the CD sound is heard at increased speed.
- Detailed CD Player / CD Changer settings and - parameters can be invoked by using the 'CD' menu.

Navigation Operation

- Press the 'Navigation' button to enter the navigation mode of the Mk4.5 set.
- First, enter the destination and, if necessary, enter the 'via point' i.e. stops on the way to the destination address.
- One can select the 'Guidance' option now (see the description in the following paragraph) or first select the other options to adjust the right navigation parameters and - settings. See the overview below:
  - Traffic info: This option is used to access information about current traffic conditions analysed by the navigation radio via RDS-TMC. To do this, first the 'C-IQ Traffic Info' data option must be activated.
  - Address manager: With help of this menu, handling of frequently used addresses for destinations and via points can be done.
  - C-IQ: For a description, refer to the part concerned elsewhere in this manual.
  - Emergency: Here, information on the current car position and geographic position is obtained. This can be useful for first aid purposes in case of an accident or other troubles.
  - Stop guidance: This option is used to switch off the navigation display and the audible (guidance) information. The system's navigation functions remain active (background operation).
    Press the 'Nav' button again to resume the complete navigation operation.
  - Settings: This function opens the 'System settings' submenu. In this menu, navigation settings can be customized.
  - Games: When not driving (e.g. waiting for a passenger), time can be passed by one of the available games.
- Detailed navigation settings and - parameters can be invoked by using the 'Navigation' menu.

Guidance Operation

The guidance screen appears as soon as the 'Navigation-Guidance' function is enabled. The layout follows in the figure hereafter, followed in its turn by a brief explanation.

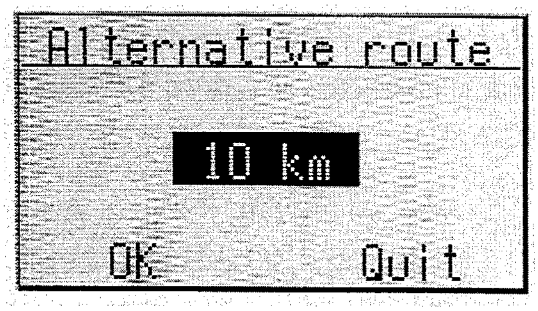


1 Road direction arrow: The arrow indicates the course of the road.
2 Simplified presentation of the next turn-off prompt.
3 Turn-off prompt: A graphic display of the next junction or turn-off. In addition, direction changes are announced with help of audible messages.
4 CD symbol:
Flashing black: The navigation computer is loading map data for the navigation corridor. The map CD must not be removed during this process.
Flashing grey: This is a sign to insert a map CD (the navigation computer needs to (re-)load the map data).
5 Road where to turn into at the next announcement.
6 Note of exclamation: This sign indicates that the car is within an area with incomplete map information.
7 Distance to the next change of direction. *Note*: the value and indication depend on the initial settings (km / m or miles / yards).
8 Option field. Move the cursor to the required symbol and confirm:
⇱ : Return to the main control menu.
⤷ : Go to 'Alternative route' menu.
🕒 : Display and select route criterion.
⧉ : Go to 'Information' screens.
9 Status field; displays one of the following possible parameters:
- Remaining driving distance.
- Remaining travel time.
- Estimated time of arrival.
- Current time.

The status field can be configured with help of the 'System settings' menu.
10 As soon as any traffic obstruction reported by TMC pertain to the planned route, a brief message appears, indicating the type of the (nearest) obstruction and the distance to it.

Alternative Route

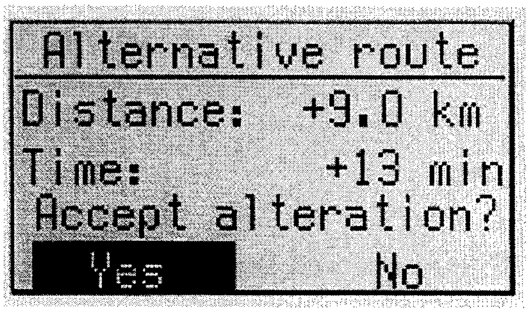
During guidance, it is possible to plan an alternative route for the navigation system, e.g. when there's a queue, accident etc. and when this is not reported by TMC.
The alternative route is calculated for a selectable distance from the current car position.
To plan an alternative route, do the following steps:
1. Move the cursor to the '⤷' symbol in the guidance screen and confirm by pressing the 'OK' button.
2. Select the right distance (see the first figure hereafter) and confirm it by 'OK'.
3. The navigation computer plans an alternative route and after some time a screen with details (distance / diversion and time delay / saving) is shown. See the second figure hereafter:



Alternative route

10 km

OK Quit



Alternative route

Distance: +9.0 km

Time: +13 min

Accept alteration?

Yes No

4. Confirm the planned alternative route by either selecting 'Yes' or 'No' and confirming it by pressing the 'OK' button.
5. In case of rejecting the alternative route, the navigation computer plans a new route to the destination from the current car position, whereafter the guidance screen reappears.
6. In case of cancelling the 'alternative route' procedure, select 'Quit' (see first figure) and press the 'OK' button.
7. In case of changing the distance, do the following steps:
   - Move the cursor to the displayed distance and press the 'OK' button.
   - Change the displayed distance in the range of 1...10km by turning the right rotary encoder.
   - Press the 'OK' button again to confirm.
   - Select 'OK' and press to confirm.

Route Selection

During guidance, the desired route type (criterion) may be selected and the 'dynamic route planning' may be either activated or de-activated.
To select or change the route type, select the icon by pressing one or more of the ◄, ▲, ▼ or ► keys until the icon is highlighted. Press the 'OK' button to see a list with the following route criterions:

- Dynamic route planning: use this option to specify whether or not TMC traffic information should be taken into account during route planning.
- Fast: If a route must be planned with the least time; it is indicated by the symbol '◷'.
- Short: If a route must be planned with the shortest distance; it is indicated by the symbol '↔'.
- Main roads: If motorways should be (a part of) the route; it is indicated by the symbol '╬'.
- No main roads: If the route shouldn't lead along motorways but only along secundary roads; it is indicated by the symbol '⧣'.

In addition, one may choose the 'No toll road' option.

Information screens

To invoke the information screens, select the symbol '▭' and press the 'OK' button. Then the following items may be selected: Route list, Event on the route, Car position, Displaying/deleting via points, Destination, GPS / Compass and Trip computer. Refer also to the menu overviews elsewhere in this chapter.

C-IQ

General

C-IQ (Intelligent Content on demand (Question)) is a system that makes it possible to use only the relevant information necessary at a certain moment for navigation. The data on the navigation CD is encrypted and can either partially or completely be activated by an access code, for a defined period. The main advantages are:

- One only pays for the information that is actually used.
- One only pays for the time period during which navigation is used.
- After the first C-IQ activation, one receives subsequent CD updates automatically.
- One has always the latest information.
- One can get hold of the activation easily via different information channels.

Activation Options

The CD contains the latest version of the road map software. It also contains travel guide information for a number of countries as well as traffic information for dynamic route planning via TMC (in countries which offer this service).
One can activate:

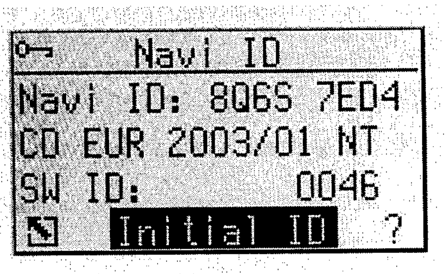
- The road data,
- Individual travel guides and, if required:
- Traffic information

In a number of countries for a certain time period. See the paragraph before.

Registering the navigation system

In order to activate C-IQ products, one must register his/her navigation system with C-IQ Service. Registering the system also provides anti-theft protection.
To register the navigation system, the 'Navi ID' number is required. In a small number of cases, the 'Initial ID' or version number of the map sofware is also required.
This data can be accessed as follows:

1. Press the 'NAVIGATION' button.
2. In the 'Main control' menu, select 'C-IQ'.
3. Select 'Navi ID'.
4. The 8-digit 'Navi ID', the currently loaded map CD and the version number of the navigation software are displayed.
5. To read out the 'Initial ID', move the cursor to 'Initial ID' - by pressing one or more of the cursor keys - and confirm the selection by pressing the 'OK' button.
6. By selecting the '↖' symbol the previous menu is invoked and by selecting the '?' symbol one can get help information.
7. The 'Navi ID' should be noted (at a secret place!) and/or remembered. To register the system, contact the C-IQ Service department and state the 'Navi ID' code.

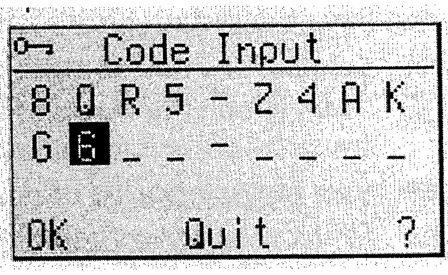


Navi ID: 8Q6S 7ED4
CD EUR 2003/01 NT
SW ID: 0046

Activating Products

Once one has received the enable code, it can be entered into the system in the following way:

1. In the 'Main control' menu, select 'C-IQ' and then 'Code Input'.
2. The cursor automatically appears at the first digit of the code; press the 'OK' button to activate each code digit.
3. Next, use the cursor keys to select the correct code digit and press the 'OK' button to confirm.
4. If necessary, a digit can be changed by selecting it by the cursor keys; press the 'OK' button, select a new digit (see before) and confirm.
5. Once the code is complete, the cursor automatically moves to the 'OK' field. Confirm 'OK' by pressing the 'OK' button.



8 Q R 5 - Z 4 A K
G 6 _ _ - _ _ _ _

6. Once the correct code is entered, the system displays information about the C-IQ products that are just activated. The system also gives information when e.g. an incorrect code has been entered, and/or if the system software is not capable of processing the encrypted information from the CD. In these cases, either the 'OK' - or 'C-IQ Service' should be selected and confirmed.

It is possible to operate the Mk4.5 system without C-IQ activation. Destinations can be entered normally; however, navigation information is only provided for activated areas and - services.

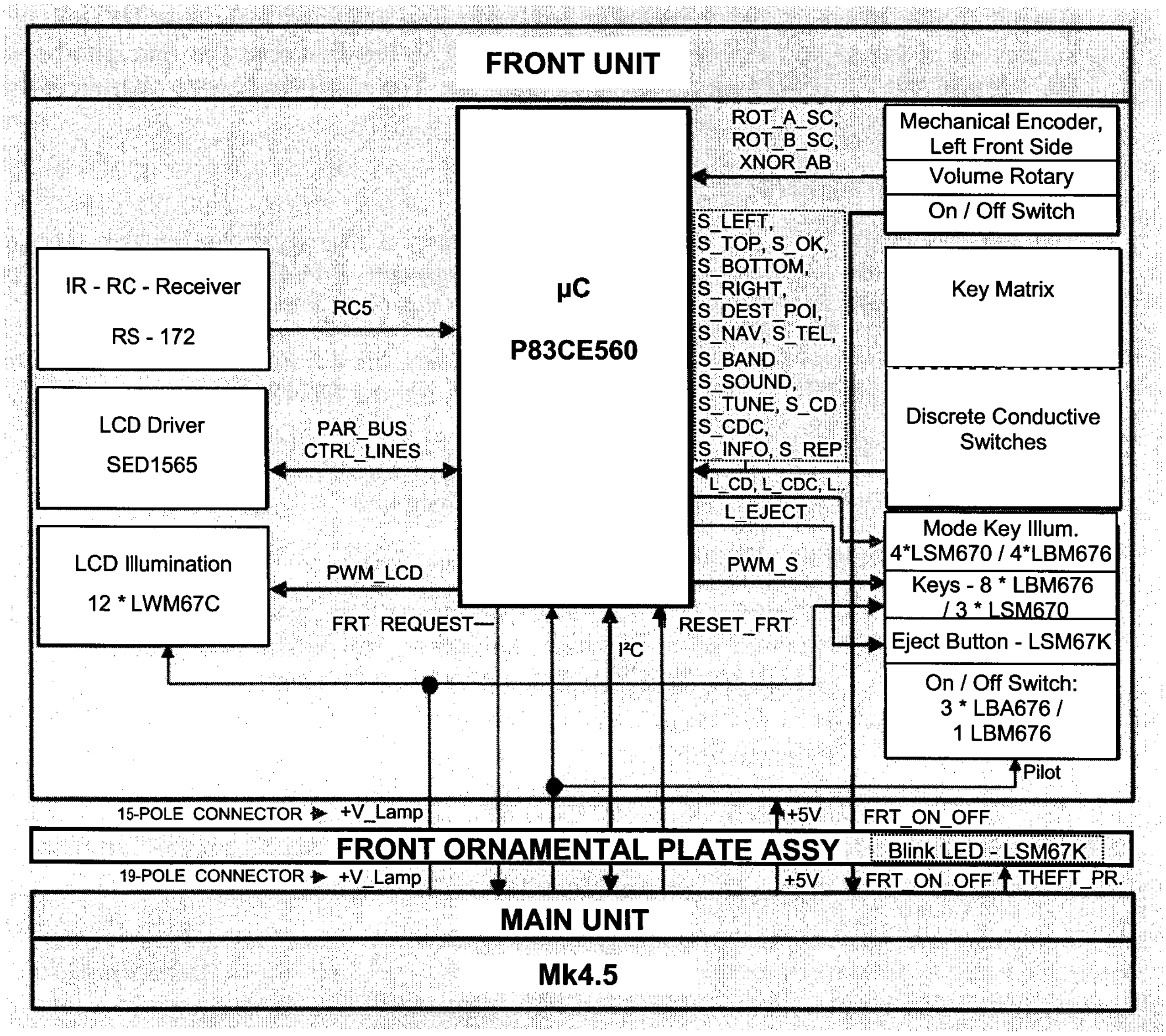
Other C-IQ Features

One has the choice of obtaining information about the current activation status. Together with the map and travel information software also the opportunity is given to inspect different products that are free of charge before they are ordered. More information that can be displayed:

- C-IQ settings.
- C-IQ info.
- C-IQ Service; in the case a mobile phone (GMS) is present, the C-IQ Service desk can be called automatically using the set.

MS4200RS FRONT UNIT TECHNICAL DESCRIPTION

Block Diagram


FRONT UNIT
µC
P83CE560
IR - RC - Receiver
RS - 172
RC5
LCD Driver
SED1565
PAR_BUS
CTRL_LINES
LCD Illumination
12 * LWM67C
PWM_LCD
FRT_REQUEST
I²C
RESET_FRT
ROT_A_SC,
ROT_B_SC,
XNOR_AB
Mechanical Encoder, Left Front Side
Volume Rotary
On / Off Switch
S_LEFT,
S_TOP, S_OK,
S_BOTTOM,
S_RIGHT,
S_DEST_POI,
S_NAV, S_TEL,
S_BAND
S_SOUND,
S_TUNE, S_CD
S_CDC,
S_INFO, S_REP
L_CD, L_CDC, L..
L_EJECT
PWM_S
Key Matrix
Discrete Conductive Switches
Mode Key Illum.
4*LSM670 / 4*LBM676
Keys - 8 * LBM676 / 3 * LSM670
Eject Button - LSM67K
On / Off Switch:
3 * LBA676 /
1 LBM676
Pilot
15-POLE CONNECTOR
+V_Lamp
+5V
FRT_ON_OFF
FRONT ORNAMENTAL PLATE ASSY
Blink LED - LSM67K
19-POLE CONNECTOR
+V_Lamp
+5V
FRT_ON_OFF
THEFT_PR.
MAIN UNIT
Mk4.5

Block Diagram Description

General

The MS4200RS Front unit uses a monochrome display. Furthermore, it contains 15 push buttons, one rotary encoder and LED illumination. The front unit should be used together with the Mk4.5 main (base) unit. For the description of that unit, refer to the part concerned elsewhere in this manual.
The front unit is connected to the main unit via an ornamental plate assy that contains a 19-pole non-twisted flex-foil cable.
Four signals of the 19-pole main connector are not used on the MS4200RS front unit, so via the 15-pole connector, the front detach unit is connected. Pins 1-15 of the 19-pole main connector correspond with pins 1-15 of the MS4200RS front connector. For the connector layouts, refer to the parts concerned.

Mk4.5 Base Unit Interfaces

FRONT_REQ:	This signal is an input to the C161. It is used by the front unit to inform the C161 when the front wants to connect to, communicate with or disconnect itself from the C161. The signal pin concerned should be low during power-down mode. This signal is connected to the FRONT_INT signal of the main (base unit).
FRT_DETACH:	This signal is an output to the OLIC of the power supply and it is active low. It informs if the

MS4200RS/00-/01 front is detached. However, in the MS4200RS/00/01 front units this signal is NOT used. In these front units, this signal is pulled down to ground. The pull-up resistor is located in the Mk4.5 base unit.

FRT_EJECT: This signal is an output to the OLIC of the power supply and it is active low. It informs about the status of the "EJECT" button (High = Button not pressed; Low = Button is pressed).

FRT_ON_OFF: This signal is an output to the OLIC of the power supply and it is active low. It informs about the status of the "ON OFF" button (High = Button not pressed; Low = Button is pressed).

PILOT: This signal informs the front unit that the vehicle lights are switched on. The pilot illumination is on under the following conditions: vehicle lights switched on, on/off switch is off or ignition is switched off. This signal is also used as supply voltage for the pilot light when the +5V front supply voltage is off.

RESET_FRONT: This signal is an input from the C161. It is active high, used to reset the P83CE560 of the front (must be a low level in power down mode).

THEFT_PROTEC: This signal supplies a blink signal for the theft protection LED - mounted at the ornamental plate assy - when the MS4200RS unit is switched off and the front unit is detached. This signal gives one 20ms pulse every one second.

Bus Interface

SCL_FRONT: This signal is an input from the main unit μP C161CS (master processor - externally pulled up by a 4.7kΩ resistor). It is a clock line of the software I^2C bus which connects together the front μP P83CE560 (slave processor here) and the C161CS. The signal must be in low level in power down mode.

SDA_FRONT: This signal is an input/output from/to the main unit μP C161CS (master processor - externally pulled up by a 4.7kΩ resistor). It is a data line of the software I^2C bus which connects together the front μP P83CE560 (slave processor here) and the C161CS. The signal must be in low level in power down mode.

RC5 Interface (Assembly Option)

The RC5 interface module consists of: infrared receiver RS-172, a resistor and a capacitor. The infrared receiver is used to convert the IR signal to an electrical signal in accordance with the RC5 standard.
The IR receiver in its turn consists of: a photo diode, pre-amplifier, AGC, band-pass filter and demodulator. The output signal is connected to the front μP P83CE560. The μP decodes the RC5 signal and converts it into I^2C frame signals. Via the front I^2C bus the I^2C frames are sent to the main μP C161CS and that μP processes the I^2C frames to appropriate control signals.

Hereafter the RC5 receiver H/W specifications follow:

Parameter	Value
High level output	>2.5V @ 10mA
Low level output	<0.5V @ 1mA
Carrier frequency	36.7kHz
Rise time	<1μsec
Fall time	<1μsec

Rotary Encoders

One rotary encoder is used: for the volume / power on/off.

Display Interface

A0: This signal controls the control / display data selection input of the SED1565 selector. When A0 = high, then the data bus D0-D7 is used as display data bus whereas D0-D7 are used as control data bus when A0 = low.

/CS1: This signal is used to select the LCD module. When low (active status), then the LCD chip selection becomes active and the data / command I/O is enabled.

D0 - D7: These lines form an 8-bit bi-directional data bus between the SED1565 and the μP P83CE560. D7 is the MSB whereas D0 is the LSB.

E:	This signal is active high and it enables the SED1565 selector for reading / writing when this signal is high.
/RES:	This signal is an active low output signal from the µP P83CE560. It is used to reset the LCD module. To initialize the settings, it is put to low.
R / W:	This signal determinates whether there data must be either read or written to / from the SED1565 selector. When this signal is high, then data is read by this selector whereas data is written to the selector when this signal is low.

Front ON / OFF Logic Behaviour

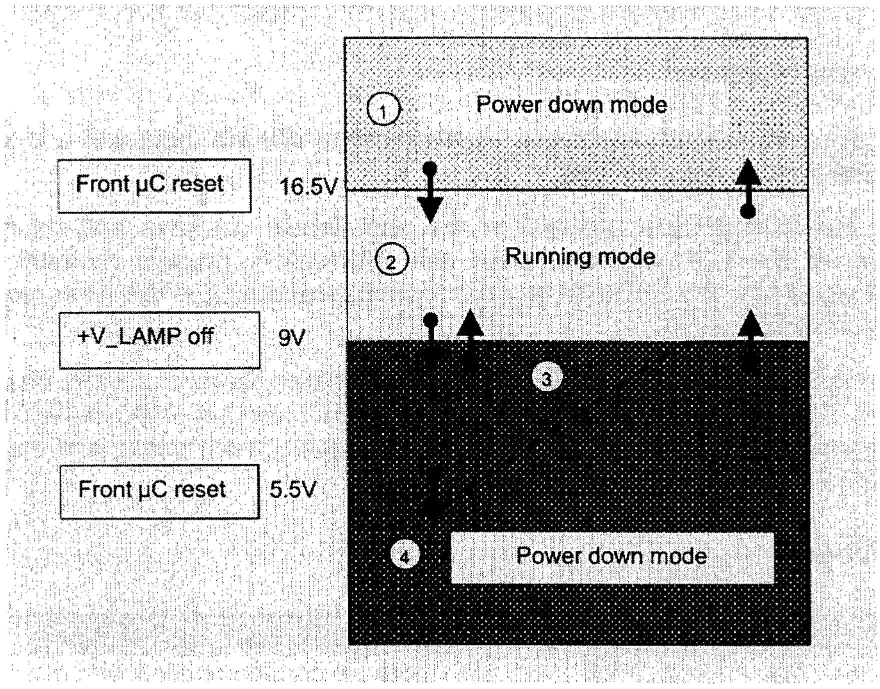
From the user's point of view there are only two states: ON and OFF.
From an electrical point of view there are mainly three different ON/OFF states for the MS4200RS front unit:

- The 'Stand-By' Mode for which the main - and front units have their minimum current consumption. It corresponds to navigation part OFF, and radio part in power down mode. The front is switched off because the front µP is held in reset mode or the supply voltage +5V(+4) is OFF. The main - and front units are completely OFF.
- The 'Degraded' Mode for which the set mutes the audio and user interface (MMI) is OFF. The radio, navigation and front µP are running, and the internal switched power supplies are ON (the SET_ON signal is '1'). This implies the front unit supply voltage +5V(+4) is ON.
  The front is NOT illuminated because the supply voltages of the LED's (+V_LAMP) is switched off.
- The 'Running' Mode for which the main - and front units have their maximum of current consumption. It corresponds basically to the state where all devices could be active.

Currents of On/Off conditions

Mode	Conditions	Min.	Typ.	Max.	Unit
Stand-By	The front is powered down Same @ with PILOT light on	- -	1.5	0.1 40	mA
Degraded	Front µP running, MMI & illum. OFF, PILOT light off Same @ with PILOT light on	- -	40 44	150 160	mA
Running	Front operates	-	200	510	mA

The front power supply functional table is given at the next page.



Main - front unit interface power supply specifications:

Supply Voltage	Current Consumption
+5V(+4) (+5V front unit supply voltage)	≤ 150mA
+V_LAMP (+10.3V LED supply voltage - except for PILOT and EJECT LED)	≤ 350mA
PILOT (+5V left rotary button LED illumination)	≤ 40mA

Front Microprocessor P83CE560

The main tasks of the front microprocessor are: to control all front-related processes, to communicate with the main unit and to process the information coming from the main unit. The microprocessor handles the inputs given by the user via the keys and rotary encoders, it controls the LCD unit to display information and it processes the IR sensor - and photo sensor information to generate the PWM signals.

The table hereafter gives a description of all pins (/... = signal concerned is active low; N.C. = not connected):

Pin	Name	Active	Direction	Signal Name	Signal Description
1	AVREF-	-	-	Ground	0V
2	AVREF+	-	-	+5V(+4)	+5V supply voltage
3	AVSS	-	-	Ground	0V
4	AVDD1	-	-	+5V(+4)	+5V supply voltage
5	P5.7	Low	In	S_BOTTOM	Cursor down key
6	P5.6	Low	In	S_LEFT	Cursor left key
7	P5.5	Low	In	S_RIGHT	Cursor right key
8	P5.4	Low	In	S_TOP	Cursor up key
9	P5.3	Low	In	S_OK	OK key
10	P5.2	Low	In	S_REP	Repeat key
11	P5.1	Low	In	S_NAV	Navigation key
12	P5.0	-	In	N.C.	Not used
13	VSS1	-	-	Ground	0V
14	VDD1	-	-	+5V(+4)	+5V supply voltage
15	ADEXS	-	-	Ground	0V
16	/PWM0	-	Out	PWM_LCD	PWM control signal for LCD
17	/PWM1	-	Out	PWM_S	PWM control signal for LED's
18	EW	-	-	Ground	0V
19	P4.0	Low	In	S_BAND	Band key
20	P4.1	Low	In	S_SOUND	Sound key
21	P4.2	Low	In	S_INFO	Info key
22	P4.3	Low	In	S_POI_DEST	Points-of-Interest / Destination key
23	RSTOUT	-	-	N.C.	Not used
24	P4.4	Low	In	S_TUNE	Tune key
25	P4.5	Low	In	S_CD	CD key
26	P4.6	Low	In	S_CDC	CDC key
27	P4.7	Low	In	S_TEL	Telephone key
28	VDD2	-	-	+5V(+4)	+5V supply voltage
29	VSS2	-	-	Ground	0V
30	RSTIN	High	In	RESET_FRT	Reset from main unit (enabled through MMI)
31	P1.0	Edge	Interrupt	XNOR_AB	Volume rotary encoder request
32	P1.1	-	-	N.C.	Not used
33	P1.2	Low	Interrupt	IR_RC5	RC5 data
34	P1.3	Low	In	TEST_CONTR_ADJUST	Black/white test picture for LCD - pulled up via 4.7kΩ
35	P1.4	-	In	ROT_A_SC	Volume rotary encoder signal A
36	P1.5	-	In	ROT_B_SC	Volume rotary encoder signal B
37	P1.6	-	-	N.C.	Not used - pulled up via 4.7kΩ here
38	P1.7	High	In	/PILOT	Inverted Pilot illumination signal
39	SCL	-	I/O	SCL_FRT	Main unit - Front I^2C bus clock signal
40	SDA	-	I/O	SDA_FRT	Main unit - Front I^2C bus data signal
41	P3.0	-	-	N.C.	Not used
42	P3.1	-	-	Ground	Not used - pulled down via 4.7kΩ
43	P3.2	-	-	Ground	Not used - pulled down via 4.7kΩ
44	P3.3	Low	Out	L_EJECT	Eject key LED illumination
45	P3.4	Low	Out	L_TUNE	Tune key LED illumination
46	P3.5	Low	Out	L_CD	CD key LED illumination
47	P3.6	Low	Out	L_CDC	CDC key LED illumination
48	P3.7	Low	Out	L_TEL	Telephone key LED illumination
49	NC1	-	-	N.C.	Not used
50	NC2	-	-	N.C.	Not used
51	XTAL2	-	In	16M_CSTCV	16MHz crystal clock input
52	XTAL1	-	In	16M_CSTCV	16MHz crystal clock input
53	VDD3	-	-	+5V(+4)	+5V supply voltage

54	VSS3	-	-	Ground	0V
55	P2.0	Low	Out	/RES	Reset signal for SED1565
56	P2.1	Low	Out	/CS1	Chip select signal for SED1565
57	P2.2	-	Out	A0	Control data / display data selection line
58	P2.3	-	Out	R / W	SED1565 Read / Write operation
59	P2.4	High	Out	E	Enable SED1565 chip
60	P2.5	-	-	N.C.	Not used
61	P2.6	-	-	N.C.	Not used
62	P2.7	Low	Out	FRT_REQUEST	Front request (interrupt)
63	PSEN	-	-	N.C.	Not used
64	ALE	-	-	N.C.	Not used
65	EA	-	-	+5V(+4)	+5V supply voltage (unfiltered)
66	VDD4	-	-	+5V(+4)	+5V supply voltage
67	VSS4	-	-	Ground	0V
68	P0.7	High	In / Out	D7	8-bit bidirectional data bus bit7 (MSB)
69	P0.6	High	In / Out	D6	8-bit bidirectional data bus bit6
70	P0.5	High	In / Out	D5	8-bit bidirectional data bus bit5
71	P0.4	High	In / Out	D4	8-bit bidirectional data bus bit4
72	P0.3	High	In / Out	D3	8-bit bidirectional data bus bit3
73	P0.2	High	In / Out	D2	8-bit bidirectional data bus bit2
74	P0.1	High	In / Out	D1	8-bit bidirectional data bus bit1
75	P0.0	High	In / Out	D0	8-bit bidirectional data bus bit0 (LSB)
76	AVDD2	-	-	+5V(+4)	+5V supply voltage
77	AVSS2	-	-	Ground	0V
78	XTAL3	-	-	N.C.	Not used
79	XTAL4	-	-	Ground	0V
80	SELXTAL1	-	In	+5V(+4)	Connected to +5V supply

Illumination

For illumination of the LCD and keys, LED's are used; 12 to illuminate the LCD panel, 19 for the front keys, 4 for the Volume / On/Off rotary encoder, 1 for the Eject button (at the back of the front) and 1 for theft protection (blinking). The last one is mounted at the front ornamental plate.
The LCD illumination LED's are fed with the +V_LAMP voltage (typ. value 10.3VDC) when the power on/off button is switched on. The maximum current is limited to 30mA to prevent damage of the LED's. The LED light intensity is determined by the PWM_LCD signal.
The following keys are illuminated by one LED: Sound, Band, Navigation, Destination / P.O.I., Info, 🗣))), cursor - and OK keys. Two LED are used to illuminate the following keys: Tune, Tel, CD and CDC.
The key illumination LED's are fed with the +V_LAMP voltage (typ. value 10.3VDC) when the power on/off button is switched on. The maximum current is limited to 15mA to prevent damage of the LED's. The LED light intensity is determined by the PWM_S signal.
Four LED's are used to illuminate the Volume / On/Off rotary encoder, at the front left side. Two different modes are used:

- Switched-On illumination mode: This mode is used after switching on the power on/off button. As supply voltage the +5V(+4) supply is used. The LED's are driven by the PWM_S signal.
- Pilot illumination mode: This mode is used when: the vehicle lights are on and the power on/off button is switched off or the ignition key is switched off. The LED's are supplied in two ways:
    - If the Mk4.5 system is in 'degraded' mode (refer to the section concerned), the pilot LED's are supplied by +5V(+4) supply and the PWM's are operating. This situation actually equal to the 'switch-on illumination mode'.
    - If the Mk4.5 system is in 'stand-by' mode (refer to the section concerned), the pilot LED's are supplied from the pilot signal itself. Because the +5V(+4) supply is off, also the PWM's are off. The total current is limited to 40mA to prevent damage of the LED's.

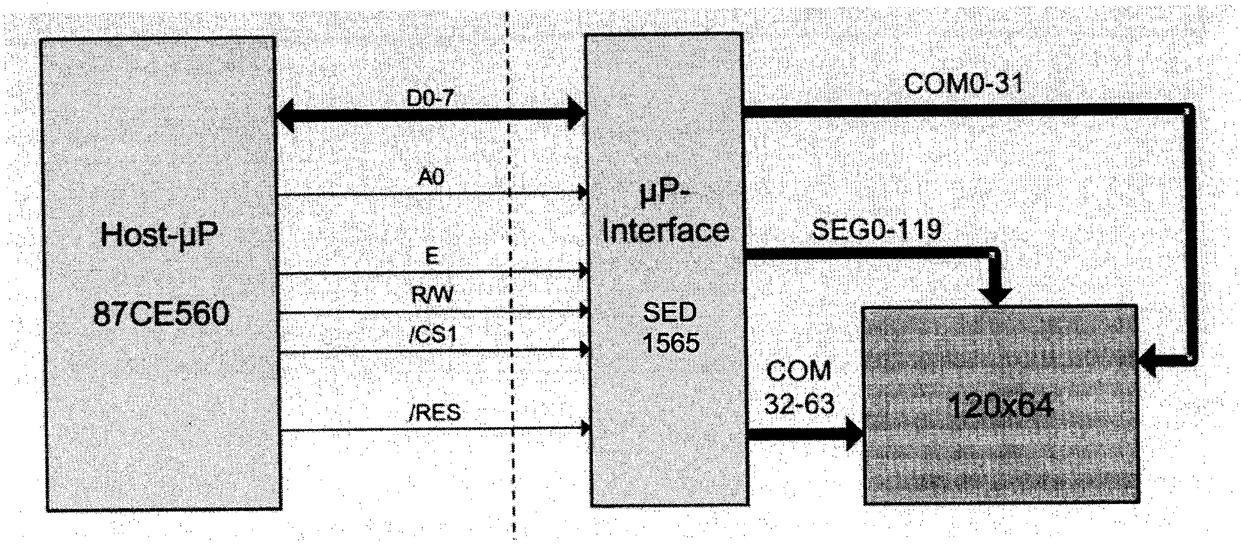
The Tune -, Tel -, CD - and CDC keys are illuminated by four LED's in a similar way as the Volume / On-off rotary encoder. Besides, these keys are illuminated by another four LED's which are controlled by resp. the L_TUNE, L_TEL, L_CD and L_CDC signals from the µP. This is meant to illuminate the key of the selected source at that moment.
The 'Eject' button is illuminated by one low-current LED which uses the +5V(+4) supply. The LED is driven by the L_EJECT signal only in the case when the flap is put down. The current is limited to 15mA.
Finally, the theft protection LED (blinking - mounted at the front ornamental plate -) flashes every second for a duration of 20msec. The LED is driven by the THEFT_PROTECTION signal.

Display Unit

The display unit consists of the following components: µP interface / display driver SED1565 and a liquid crystal matrix of 120x64 pixels. The following busses are used between the driver and the liquid crystal display:

- COM0-31
- COM32-64
- SEG0-119

With help of these busses it is possible to control each pixel.
The figure below shows the simplified block diagram of the display unit and how it is connected to the front µP P83CE560.


Host-µP
87CE560
D0-7
A0
E
R/W
/CS1
/RES
µP-
Interface
SED
1565
COM0-31
SEG0-119
COM
32-63
120x64

MS4200RS Front Unit Connectors

Main PCB Interface Connector

Connector 1900			
Pin	**I/O**	**Signal**	**Comments**
1	I	Reset Front	Resets the front unit microprocessor
2	I	Pilot Light	Informs the front unit - vehicle lights are on
3	I	Ground	Ground line connected to switch housings
4	I/O	SDA_Front	Data line of I^2C bus between front / Mk4.5
5	I	Ground	0V
6	I/O	SCL_Front	Clock line of I^2C bus between front / Mk4.5
7	I	+5V([+4])	Switched +5V supply voltage
8	I	Ground	0V
9	O	Front_(Interrupt_)Request	Interrupt / Request from front to Mk4.5 base
10	O	Front_ON / OFF	Informs Mk4.5 base - on/off button pressed
11	O	Front_Eject	Informs Mk4.5 base - eject button is pressed
12	O	Front_Detach	Informs Mk4.5 base - front is detached
13	I	Ground	0V
14	I	$+U_{Lamp}$	Power supply for front illumination (LED's)
15	I	$+U_{Lamp}$	Power supply for front illumination (LED's)

LCD Module Connector

Connector 1902			
Pin	**I/O**	**Signal**	**Comments**
1	O	/CS1 (/ = active low)	Chip select signal for LCD module
2	O	/RES (/ = active low)	Reset signal for LCD module
3	O	A0	Control data / display data selection input of SED1565; High = Display data; Low = Control data
4	O	R / W	Read / write signal for LCD module; High = Read mode; Low = Write mode
5	O	E	Enable signal for LCD module; Read / write operation initiated when high
6	I/O	D0	8-bit bidirectional data bus bit 0 (LSB)
7	I/O	D1	8-bit bidirectional data bus bit 1
8	I/O	D2	8-bit bidirectional data bus bit 2
9	I/O	D3	8-bit bidirectional data bus bit 3
10	I/O	D4	8-bit bidirectional data bus bit 4
11	I/O	D5	8-bit bidirectional data bus bit 5
12	I/O	D6 (SCK)	8-bit bidirectional data bus bit 6
13	I/O	D7 (SDA)	8-bit bidirectional data bus bit 7 (MSB)
14	O	V_{DD}	+5V logic supply voltage for LCD module
15	O	V_{SS}	0V (GND) for LCD module
16	I	V_{OUT}	Capacitor connection between this pin and GND
17	I	CAP3-	Capacitor connection between this pin and CAP1+
18	I	CAP1+	Capacitor connection between this pin and CAP1-
19	I	CAP1-	Capacitor connection between this pin and CAP1+
20	I	CAP2-	Capacitor connection between this pin and CAP2+
21	I	CAP2+	Capacitor connection between this pin and CAP2-
22	I	V1	Multi-level power supply for LCD - $V_{DD} \geq V1$
23	I	V2	Multi-level power supply for LCD - $V1 \geq V2$
24	I	V3	Multi-level power supply for LCD - $V2 \geq V3$
25	I	V4	Multi-level power supply for LCD - $V3 \geq V4$
26	I	V5	Multi-level power supply for LCD - $V4 \geq V5$
27	I	V_R	Output voltage regulator terminal for LCD

Flap-Down Switch (Connector)

Connector 1901			
Pin	**I/O**	**Signal**	**Comments**
1	I	FLAP_DOWN	Informs the Mk4.5 base unit that the flap is open (down); High = Front is closed / up; Low = Front is opened / down
2	O	GND	Power ground (0V)

Rotary Switch Connector

Connector 1920			
Pin	**I/O**	**Signal**	**Comments**
1	I	ROT_B	Rotary pulse B
2	O	GND	Power ground (0V)
3	I	ROT_A	Rotary pulse A
4	O	GND	Power ground (0V) - connected to shield
5	O	GND	Power ground (0V)
6	O	FRT_ON_OFF	Informs Mk4.5 base that on/off button is pressed

MS4200RS Front Checks

The following checks should be done first when the front unit is suspected to be defective:

Current Consumption

Pilot Light	+5V	+U_{Lamp}
<40mA	<50 mA	<350 mA

Voltage Supply

Component	Ref. (Pos.)	Test Point	Min.	Typ.	Max.
µP P83CES60 (pin 14)	7904	I164	4.6V	5V	5.4V
IR Sensor TSOP2237LL1	6900	I166	4.6V	5V	5.4V
NOR Gates HEF-4077	7900	I167	4.6V	5V	5.4V

Reference Oscillator Frequencies

Devices	Ref. (Pos.)	Test Point	83CE560 - pin 51 / 52
Frequency	7904	I168 and I169	16 MHz ± 0.5%

Button Function

The brightness of the buttons (text field) should have 3-5 Cd/m².

Performance check of the LCD

Set the front in test mode by pressing the RADIO/BAND, 🗣))) and POWER keys simultaneously. By pressing the CD key, you make appear in sequence one of the 7 different frames on the display in the following order:

- Border / Frame LCD
- Full LCD
- Blank LCD
- Chessboard pattern 1
- Chessboard pattern 2 (reversed pattern w.r.t. pattern 1)
- Screen with lines
- Screen half blank, half full

The screen border LCD shows the performance of the LCD. This screen is a strong load for the driver IC. Service people should check that the display has no crosstalk or some bad homogeneities.

Here a short explanation follows of all test screens:

- The screen - *Full LCD* - shows a full screen with all pixels on. This screen shows faulty pixels as black pixels.
- The screen - *Blank LCD* - shows a full black screen with all pixels off. This screen shows faulty pixels as lit pixels.
- The screen - *Chessboard 1* - shows a screen alternating one pixel on and one pixel off. This screen shows faulty pixels as a disturbed chessboard pattern.
- The screen - *Chessboard 2* - shows a screen alternating one pixel off one pixel on (reversed pattern 1). This screen shows faulty pixels as a disturbed chessboard pattern.
- The screen *with lines* shows the performance of the LCD. This screen is a strongly load for the driver IC, so don't use this screen test mode too long time.
  The service technician should check that the display has no crosstalk or some bad homogeneities.
- The screen *half blank and half full* should be used for contrast measuring.

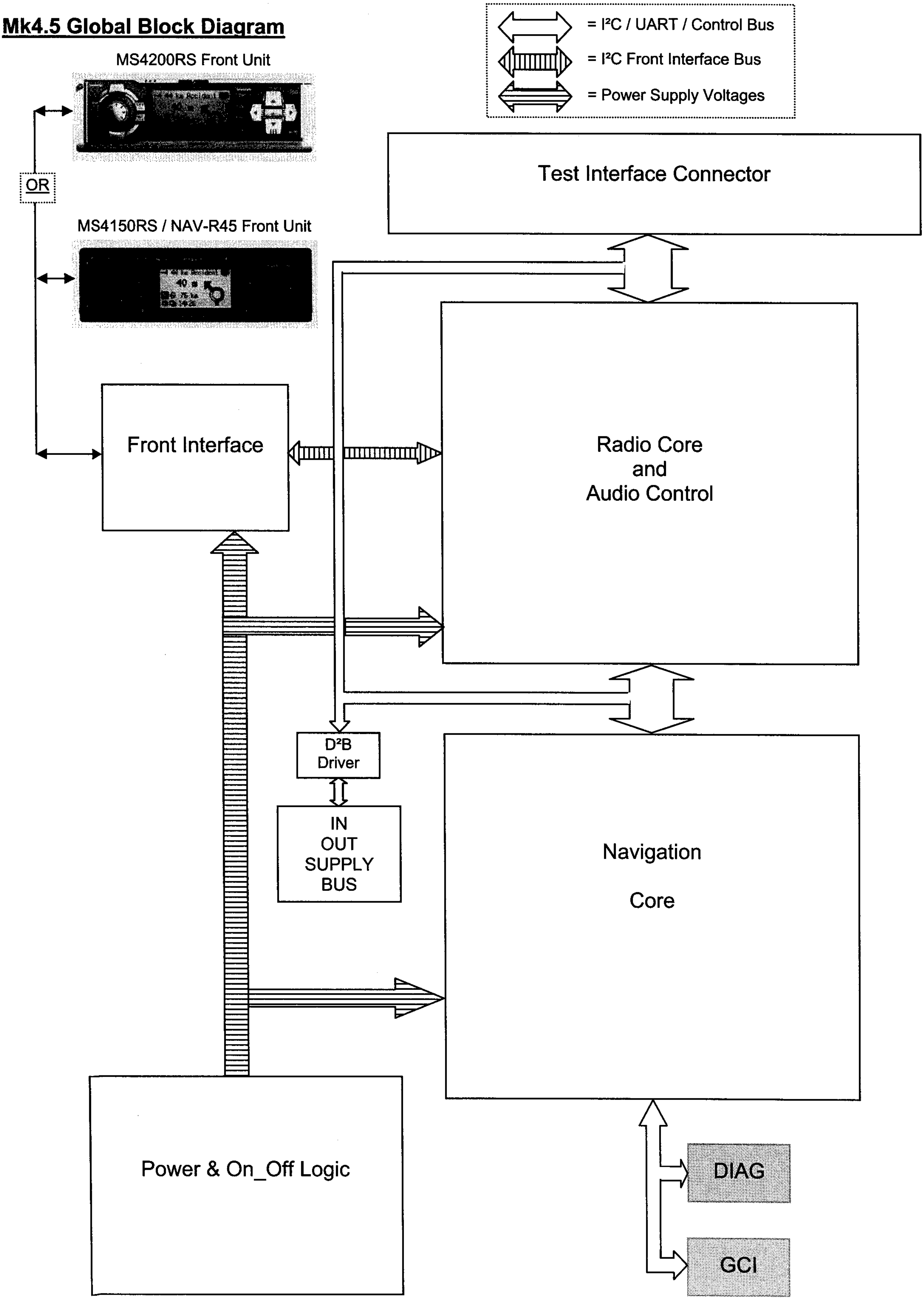
LIST OF ACRONYMS & GLOSSARY

The list below gives an explanation of used acronyms and clarifies them where necessary.

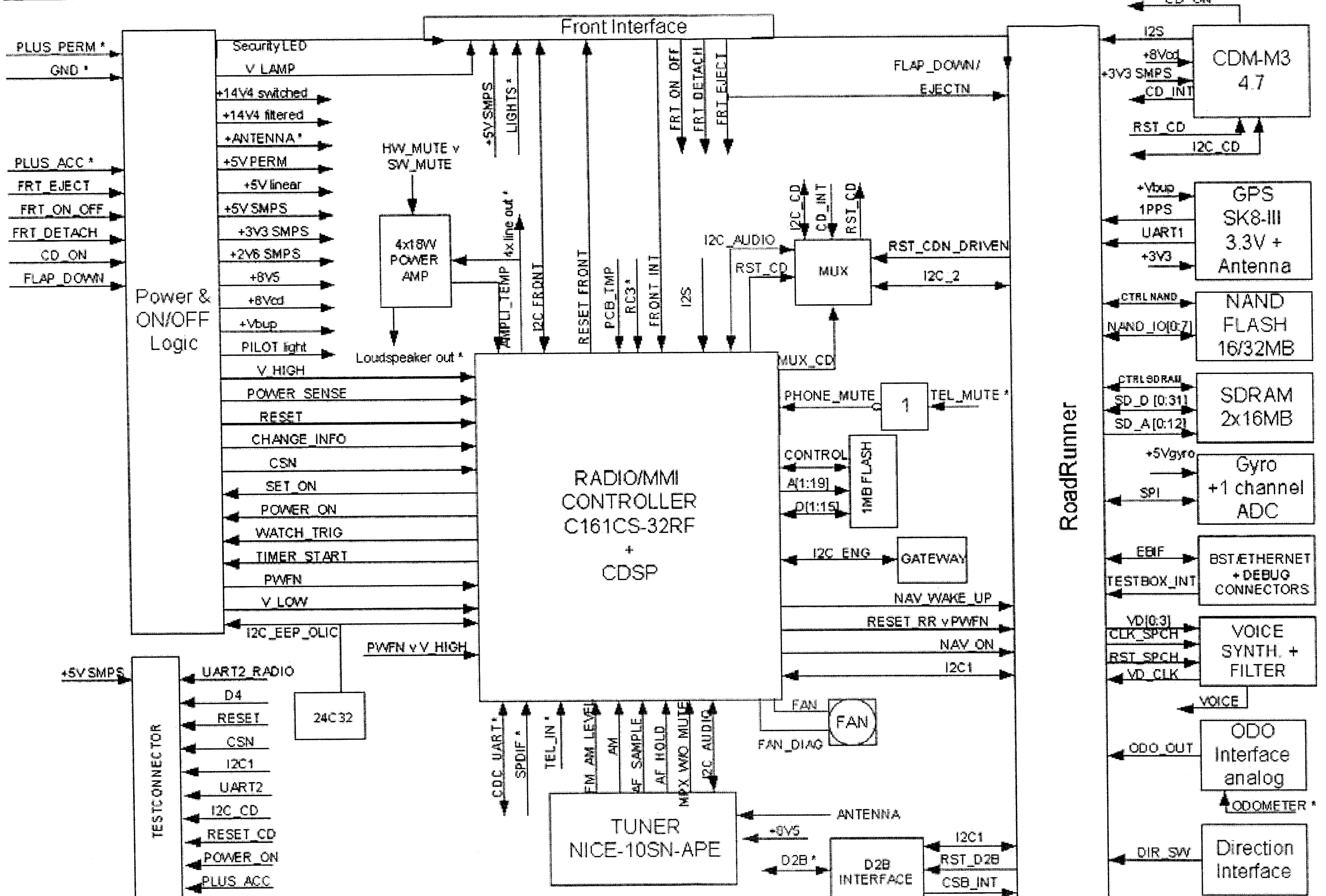
1PPS	1 Pulse Per Second signal from GPS
ADC	Analog to Digital Converter
ARCNET	Universal local area network
ASIC	Application Specific Integrated Circuit
ASW	Application Software
BGA	Ball Grid Array
BON	Bed of Needles
BST	Boundary Scan Test
CA	Conditional Access
CAN	Community Area Network
CDC	Compact Disc Changer
CDSP	Car Digital Sound Processor
CLIN	Clock line of I^2S bus
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CSI	Customer Specific Interface
D^2B	Domestic Digital Bus (home automation electrical standard)
DAC	Digital Analog Converter
DAIN	Data line of I^2S bus
DIAG	Diagnose interface (via RS-232C)
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFIN	Error Flag line of I^2S bus
EMC	Electro Magnetic Compatibility
ESD	Electro Static Discharge
FEPROM	Flash Erasable and Programmable Read Only Memory
FMEA	Failure Mode and Effect Analysis
GCI	GSM Carin Interfaces
GND	Ground
GPIO	General Purpose Input Output
GPS	Global Positioning System
HMI	Human Machine Interface
HW	Hard Ware
I^2C	Inter-Integrated Circuit (bus)
I^2S	Inter-IC Sound (CD data bus)
ICT	In-Circuit Test
I/O	Input / Output
IR	Infra Red
JTAG	Joint Test Action Group
LED	Light Emitting Diode
MRQ	Master Request line
MUX	Multiplexer
NAV	Navigation
N.C.	Not connected
NICE	New In Car Entertainment
NR	Not Relevant
OEM	Original Equipped Manufacturer
OH	Output fixed at High level
OL	Output fixed at Low level
PCB	Printed Circuit Board
PLL	Phase Locked Loop
PQR	Performance Quality and Reliability
PWB	Printed Wired Board
PWFN	Power Fail Not
QDS	Quality Description Sheet
RAM	Random Access Memory
RC	Remote Control
RC5	Remote Control protocol (Philips standard for infra-red codes, generation 5)
RDS	Radio Data System
RRASIC	RoadRunner ASIC
RS232	Recommended (EIA) Standard 232 (computer serial interface, IEEE - interface between data terminal equipment and data communication equipment)
RXD	Receive Data line (RS232C)
SCL	I^2C - clock line
SDA	I^2C - data line
SDRAM	Synchronous Dynamic Random Access Memory
SMD	Surface Mount Device
SMPS	Switched Mode Power Supply
SPC	Statistic Process Control
SPDIF	SONY PHILIPS Digital Interface Format
SW	Soft-Ware
T.B.D.	To Be Defined
TSW	Test Software
TXD	Transmit Data line (RS232C)
UART	Universal Asynchronous Receiver Transmitter
U_{batt}	Car battery voltage
U_{bfs}	Filtered and switched car battery voltage
VSS	Vehicle Speed Signal
WSIN	Word Select, frame sync for I^2S bus

Mk4.5 SYSTEM DESCRIPTION

Mk4.5 Global Block Diagram


= I²C / UART / Control Bus
= I²C Front Interface Bus
= Power Supply Voltages
MS4200RS Front Unit
OR
MS4150RS / NAV-R45 Front Unit
Test Interface Connector
Front Interface
Radio Core
and
Audio Control
D²B
Driver
IN
OUT
SUPPLY
BUS
Navigation
Core
Power & On_Off Logic
DIAG
GCI

Mk4.5 Detailed Block Diagram


Front Interface
Power & ON/OFF Logic
PLUS_PERM *
GND *
PLUS_ACC *
FRT_EJECT
FRT_ON_OFF
FRT_DETACH
CD_ON
FLAP_DOWN
Security LED
V_LAMP
+14V4 switched
+14V4 filtered
+ANTENNA *
+5V PERM
+5V linear
+5V SMPS
+3V3 SMPS
+2V6 SMPS
+8V5
+8Vcd
+Vbup
PILOT light
V_HIGH
POWER_SENSE
RESET
CHANGE_INFO
CSN
SET_ON
POWER_ON
WATCH_TRIG
TIMER_START
PWFN
V_LOW
I2C_EEP_OLIC
24C32
PWFN v V_HIGH
HW_MUTE v SW_MUTE
4x18W POWER AMP
Loudspeaker out *
4x line out *
AMPLI_TEMP
+5V SMPS
LIGHTS *
I2C_FRONT
RESET_FRONT
PCB_TMP
RC3 *
FRONT_INT
I2S
FRT_ON_OFF
FRT_DETACH
FRT_EJECT
FLAP_DOWN/ EJECTN
RADIO/MMI CONTROLLER C161CS-32RF + CDSP
I2C_CD
CD_INT
RST_CD
I2C_AUDIO
RST_CD
MUX
MUX_CD
RST_CDN_DRIVEN
I2C_2
PHONE_MUTE
1
TEL_MUTE *
CONTROL
A[1:19]
D[1:15]
1MB FLASH
I2C_ENG
GATEWAY
NAV_WAKE_UP
RESET_RR v PWFN
NAV_ON
I2C1
FAN
FAN_DIAG
CDC_UART *
SPDIF *
TEL_IN *
FM_AM_LEVEL
AM
AF_SAMPLE
AF_HOLD
MPX W/O MUTE
I2C_AUDIO
TUNER NICE-10SN-APE
ANTENNA
+8V5
D2B *
D2B INTERFACE
I2C1
RST_D2B
CSB_INT
RoadRunner
CD_ON
I2S
+8Vcd
+3V3 SMPS
CD_INT
RST_CD
I2C_CD
CDM-M3 4.7
+Vbup
1PPS
UART1
+3V3
GPS SK8-III 3.3V + Antenna
CTRL NAND
NAND_IO[0:7]
NAND FLASH 16/32MB
CTRL SDRAM
SD_D [0:31]
SD_A [0:12]
SDRAM 2x16MB
+5Vgyro
SPI
Gyro +1 channel ADC
EBIF
TESTBOX_INT
BST/ETHERNET + DEBUG CONNECTORS
VD[0:3]
CLK_SPCH
RST_SPCH
VD_CLK
VOICE SYNTH. + FILTER
VOICE
ODO_OUT
ODO Interface analog
ODOMETER *
DIR_SW
Direction Interface
DIRECTION *
+5V SMPS
TESTCONNECTOR
UART2_RADIO
D4
RESET
CSN
I2C1
UART2
I2C_CD
RESET_CD
POWER_ON
PLUS_ACC

* = connected to main connector

RADIO-/AUDIO-/POWER SUPPLY PART

Microprocessor C161

Pin Description

The tables below show a layout of all 128 pins of the C161. The following items are shown successively from left to right:

- Pin number.
- Port name.
- Signal name as used in the Mk4.5. NC = not connected.
- ACT = active status: HIGH = active high; LOW = active low; L T1 = low at moment T1; H T3 = high at moment T3; H/L = high or low, dependent on configuration; ANALOG = analogue signal; NR = not relevant.
- DIR = signal direction: OUTPUT or INPUT; I/O = input and output.
- PWR DOWN = voltage level at the pin concerned during power down status: OL = output fixed at low level; OH = output fixed at high level; NR = not relevant; I = interrupted.

N° PIN	NAME	NAME IN MK4.5	ACT	DIR	PWR DOWN
1	RSTOUT-	NC			
2	NMI-	GND			
3	VSS	GND			
4	VDD	5V PERM			
5	P6.0/CS0-	NC		OUTPUT	
6	P6.1/CS1-	MUX_CD	NR	OUTPUT	OL
7	P6.2/CS2-	RESET_FRONT	HIGH	OUTPUT	OL
8	P6.3/CS3-	NC		OUTPUT	
9	P6.4/CS4-	ILLUM_DECK	HIGH	OUTPUT	OL
10	P6.5/HOLD-	NC		OUTPUT	
11	P6.6/HLDA-	FAN_ON	HIGH	OUTPUT	OL
12	P6.7/BREQ-	EL_ON	HIGH	OUTPUT	OL
13	P7.4/CC28IO	SDA_FRONT	NR	I/O	OL
14	P7.5/CC29IO	SCL_FRONT	NR	O	OL
15	P7.6/CC30IO	SDA_ENG	NR	I/O	OH
16	P7.7/CC31IO	SCL_ENG	NR	O	OH
17	VSS	GND			
18	VDD	5V PERM			
19	P9.0/SDA0	SDA1	NR	I/O	OL
20	P9.1/SCL0	SCL1	NR	I/O	OL
21	P9.2/SDA1	SDA_EEP_OLIC	NR	I/O	OH
22	P9.3/SCL1	SCL_EEP_OLIC	NR	O	OH
23	P9.4/SDA2	SDA_AUDIO	NR	I/O	OL
24	P9.5	SCL_AUDIO	NR	O	OL
25	VSS	GND			
26	VDD	5V PERM			
27	P5.0/AN0	RC3_REF	ANALOG	INPUT	NR
28	P5.1/AN1	POWER_SENSE	ANALOG	INPUT	NR
29	P5.2/AN2	AMPLI_TEMP	ANALOG	INPUT	NR
30	P5.3/AN3	CD_INT	LOW	INPUT	OL
31	P5.4/AN4	CHANGE INFO	HIGH	INPUT	OL
32	P5.5/AN5	RC3	ANALOG	INPUT	NR
33	P5.6/AN6	T1/T3	L T1 / H T3	INPUT	OH
34	P5.7/AN7	FAN_DIAG	ANALOG	INPUT	
35	VAREF	5V PERM			
36	VAGN	GND			
37	P5.12/AN12/T6IN	ILLUM	HIGH	INPUT	OL
38	P5.13/AN13/T5IN	PHONE_MUTE	H/L	INPUT	OL
39	P5.14/AN14/T4EUD	FRONT_INT	LOW	INPUT	OL
40	P5.15/AN15/T2EUD	PAUSE	HIGH	INPUT	OL
41	VSS	GND			
42	VDD	5V PERM			
43	P2.8/CC8IO/EX0IN	RDS_DATA	NR	INPUT	OL
44	P2.9/CC9IO/EX1IN	NAV_ON	NR	INPUT	OL
45	P2.10/CC10IO/EX2IN	RDS_CLK	NR	OUTPUT	OL
46	P2.11/CC11IO/EX3IN	V_LOW	LOW	INPUT	I
47	P2.12/CC12IO/EX4IN	NC		OUTPUT	
48	P2.13/CC13IO/EX5IN	NC		OUTPUT	
49	P2.14/CC14IO/EX6IN	V_HIGH	LOW	INPUT	I
50	P2.15/CC15IO/EX7IN	RESET_RR	HIGH	OUTPUT	OL
51	VSS	GND			
52	VDD	5V PERM			
53	P3.0/T0IN/TXD1	TXD1_RADIO	NR	OUTPUT	OL
54	P3.1/T6OUT/RXD1	RXD1_RADIO	NR	INPUT	OL
55	P3.2/CAPIN	TIMER_START	HIGH	OUPUT	OH
56	P3.3/T3OUT	WATCH_TRIG	NR	OUTPUT	OH
57	P3.4/T3EUD	POM	HIGH	OUTPUT	OL
58	P3.5/T4IN	SET_ON	HIGH	OUTPUT	OL
59	P3.6/T3IN	SW_MUTE	HIGH	OUTPUT	OL
60	P3.7/T2IN	AF_HOLD	LOW	OUTPUT	OL
61	P3.8/MRST	RST_CD	LOW	OUTPUT	OL
62	P3.9/MTSR	AF_SAMPLE	LOW	OUTPUT	OL
63	P3.10/TXD0	RXD2_RADIO	NR	I/O	OL
64	P3.11/RXD0	TXD2_RADIO	NR	I/O	OL
65	P3.12/BHE-/WRH-	RESET_CDSP	LOW	OUTPUT	OL
66	P3.13/SCLK	NC		OUTPUT	
67	P3.14/CLKOUT	NAV_WAKE_UP	HIGH	OUTPUT	OL
68	VDD	5V PERM			
69	VSS	GND			
70	P4.0	A16			
71	P4.1	A17			
72	P4.2	A18			
73	P4.3	A19			
74	P4.4	ANTENNA_ON	HIGH	OUTPUT	OL
75	P4.5/CAN_R	NC		OUTPUT	
76	P4.6/CAN_T	NC		OUTPUT	
77	P4.7	SEL_FR	HIGH	OUTPUT	OL
78	VDD	5V PERM			
79	VSS	GND			
80	RD-	RDN	LOW	OUTPUT	
81	WR-/WRL-	WEN2	NR	OUTPUT	
82	READY-	READYN	NR	INPUT	
83	ALE	NC			
84	EA-	GND			
85	P0L0	DO			
86	P0L1	D1			
87	P0L2	D2			
88	P0L3	D3			
89	P0L4	D4			
90	P0L5	D5			
91	P0L6	D6			
92	P0L7	D7			
93	VDD	5V PERM			
94	VSS	GND			
95	P0H0	D8			
96	P0H1	D9			
97	P0H2	D10			
98	P0H3	D11			
99	P0H4	D12			
100	P0H5	D13			
101	P0H6	D14			
102	P0H7	D15			
103	P1L0	NC			
104	P1L1	A1			
105	P1L2	A2			
106	P1L3	A3			
107	P1L4	A4			
108	P1L5	A5			
109	P1L6	A6			
110	P1L7	A7			
111	VDD	5V PERM			
112	VSS	GND			
113	P1H0	A8			
114	P1H1	A9			
115	P1H2	A10			
116	P1H3	A11			
117	P1H4/CC25IO	A12			
118	P1H5/CC25IO	A13			
119	P1H6/CC26IO	A14			
120	P1H7/CC27IO	A15			
121	VDD	5V PERM			
122	VSS	GND			
123	XTAL2	4MHz			
124	XTAL1	4MHz			
125	VSS	GND			
126	XTAL3	XTAL2			
127	XTAL4	NC			
128	RSTIN-	RESET	LOW	INPUT	NR

C161 Signal Description

CDC Bus Interface

The following signals are used:

CDC_TXD:	This signal is used to transmit the data from the C161 to the CD changer; it is the buffered version of the TXD1_RADIO signal.
CDC_RXD:	This signal is used to receive the data from the CD changer to the C161; it is the buffered version of the RXD1_RADIO signal.

Refer also to the 'UART Interface' paragraph.

Gateway Bus Interface

SCL_ENG:	This signal is the 'Clock' line of the Gateway I2C_ENG bus (used when servicing the PCB). This signal should be high during power-down mode.
SDA_ENG:	This signal is the 'Data' line of the Gateway I2C_ENG bus (used when servicing the PCB). This signal should be high during power-down mode.

UART Interface

For the C161, two UART interfaces are used:

- C161 UART1 (CDC_UART in the main block diagram; TxD1_RADIO and RxD1_RADIO in the circuit diagrams) between the C161 and the CD changer interface.
  The following signals are used:
  TXD1_RADIO: This signal is used to transmit information from the C161; it is connected to the TXD1 pin of the C161. This signal should be low during power-down mode.
  RXD1_RADIO: This signal is used to receive information to the C161; it is connected to the RXD1 pin of the C161. This signal should be low during power-down mode.
- C161 UART2 (UART(2)_RADIO in the main block diagram; TxD2_RADIO and RxD2_RADIO in the circuit diagrams) between the C161 and the test/service connector (pos.1602). It can be used as an external link for 'fleet management'. In this case, the C161 must be 'disconnected' by the software. It also can be used to download the software of the C161.
  The following signals are used:
  TXD2_RADIO: This signal is used to transmit information to the C161; it is connected to the TXD0 pin of the C161. This signal should be low during power-down mode.
  RXD2_RADIO: This signal is used to receive information from the C161; it is connected to the RXD0 pin of the C161. This signal should be low during power-down mode.

Hardware I²C Multi-Master Bus interface

SDA1:	This signal is an input/output to/from the C161. This is the 'Data' line of the hardware I²C bus that interconnects the RRASIC, the C161, the D²B controller and the test/service connector. The signal pin concerned is pulled up by a 2.2kΩ resistor and should be high during power-down mode.
SCL1:	This signal is an output from the C161. This is the 'Clock' line of the hardware I²C bus that interconnects the RRASIC, the C161, the D²B controller and the test/service connector. The signal pin concerned is pulled up by a 2.2kΩ resistor and should be high during power-down mode.

Software I²C C161 Master Bus Interface

The maximum transmission speed of this bus interface is 400kHz. The Software I²C bus is defined as follows:

Device	Channel No.
EEP_OLIC	0
FRONT	1
ENG	2
AUDIO	3

SDA_EEP_OLIC:	This signal is an input/output to/from the C161. This is the 'Data' line of the software I²C bus (I2C_EEP_OLIC) that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.

SCL_EEP_OLIC: This signal is an output from the C161. This is the 'Clock' line of the software I^{2}C bus (I2C_EEP_OLIC) that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.

SDA_FRONT: This signal is an input/output to/from the C161. This is the 'Data' line of the software I^{2}C bus (I2C_FRONT) that interconnects the Front unit and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

SCL_FRONT: This signal is an output from the C161. This is the 'Clock' line of the software I^{2}C bus (I2C_FRONT) that interconnects the Front unit and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

SDA_ENG: This signal is an input/output to/from the C161. This is the 'Data' line of the software I^{2}C bus (I2C_ENG) that interconnects the Gateway and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.

SCL_ENG: This signal is an output from the C161. This is the 'Clock' line of the software I^{2}C bus (I2C_ENG) that interconnects the Gateway and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.

SDA_AUDIO: This signal is an input/output to/from the C161. This is the 'Data' line of the software I^{2}C bus (I2C_AUDIO) that interconnects the NICE tuner, the CDSP, the CD multiplexer and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

SCL_AUDIO: This signal is an output from the C161. This is the 'Clock' line of the software I^{2}S bus (I2C_AUDIO) that interconnects the NICE tuner, the CDSP, the CD multiplexer and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

OLIC (On_off Logic IC) and Power Supply Interface

ANTENNA_ON: This signal is an output from the C161. This signal controls the switched +12.0V for an external electrical / electronic antenna or for an external amplifier (booster).
The signal pin concerned is not pulled up; it should be low during power-down mode.

CHANGE_INFO: This signal is an input to the C161 and it is derived from the OLIC. When the C161 is running, this signal goes high to interrupt the C161, each time an input of the OLIC is changing.
The signal pin concerned should be high during power-down mode.

EL_ON: This signal is an output from the C161. It controls a transistor stage to switch on the EL foil illumination voltage for the front unit.

POWER_SENSE: This signal is an analogue input to the C161 (*note: an ADC pin is needed*). The information at the signal pin concerned is relative to the input power supply voltage. Depending on its status, the C161 may give a command to switch off the power supply voltage(s) if one or more voltages exceed its/their nominal value.

PWFN: This signal is an input to the C161. This signal is interconnected via a diode to the V_HIGH input of the C161. It goes low when the +5.0, +3.3V or 2.6V supply voltage(s) are below their specified limits.
The signal pin concerned should be high during power-down mode.

RESET: This signal is an output from the OLIC to the C161; it is inverted via a transistor stage and that signal forms the 'Reset' input of the C161 (active low).

SET_ON: This signal is an output from the C161. The signal controls the switched voltages: +14.0V, +8.5V, +5.0V and +3.3V for the radio and navigation parts of the system.
When 'SET_ON' is high, the voltage regulators of the power supply are switched on.
The signal pin concerned is not pulled up; it should be low during power-down mode.

TIMER START: This signal is an output from the C161 to the OLIC. When a 'V-LOW' is detected, the C161 sends a pulse to the OLIC and goes into power-down mode. The 'TIMER START' signal pin should be high during power-down mode.

V_HIGH: This signal is an input to the C161. As soon as the input voltage of the set exceeds approx. +17V, this signal goes low and interrupts the C161 to inform it of the power supply failure.
The signal pin concerned should be high during power-down mode.

V_LOW: This signal is an input to the C161. When the system input voltage comes below approx. +9.5V, the 'V_LOW' signal goes low and interrupts the C161 to inform the processor of the power supply failure.
The signal pin concerned should be high during power-down mode.

WATCH_TRIG: This signal is an output from the C161 to the OLIC. This signal exists of a square signal with a frequency of 2Hz. This signals is used to re-load the watchdog timer of the OLIC and it exists only when the C161 is operating.
The signal pin concerned should be high during power-down mode.

CDSP Interface

AF_HOLD:	This signal is an output from the C161. During the whole update procedure of the AF parameters (including the hidden mute), this signal has to be low. The signal pin concerned should be low during power-down mode.
AF_SAMPLE:	This signal is an output from the C161. When this signal goes low, the set is synchronized at the AF; the CDSP has to freeze the level, multipath etc. so that the C161 can read these values. The signal pin concerned should be low during power-down mode.
PAUSE:	This signal is an input to the C161. This signal is active high, i.e. it becomes high as soon as a reception 'pause' is detected when the system is in 'FM' mode. The signal pin concerned should be low during power-down mode.
POM:	The 'POM' (Power-On Mute) signal is an output from the C161. This signal is used to mute the CDSP after switching on the power to avoid 'plops' due to the rising of the supply voltage. The signal pin concerned should be low during power-down mode.
RDS_CLK:	This signal is an output from the C161. This is the 'Clock' line of the serial bus used for transmission of the RDS information between the C161 and the CDSP. The signal pin concerned should be low during power-down mode.
RDS_DATA:	This signal is an input to the C161. This is the 'Data' line of the serial bus used for transmission of the RDS information between the C161 and the CDSP. The signal pin concerned should be low during power-down mode.
RESET_CDSP:	This signal is an output from the C161. It resets the CDSP. The minimum time duration of the 'low-status' of this signal should be 150ms, after the set is switched on. The signal pin concerned should be low during power-down mode.
SEL_FR:	This signal is an output from the C161. From the moment the tuner is synchronized at the AF to the end of the update procedure, this signal has to be high. The signal pin concerned should be low during power-down mode.

Power Amplifier Interface

AMPLI_TEMP:	This signal is an analogue input to the C161 (*note: an ADC pin is needed*). This signal detects the status of the temperature sensor which is mounted close to the power amplifier.
SW_MUTE:	This signal is an output from the C161. It is used to switch on of off the power amplifier muting. The signal pin concerned should be low during power-down mode.

Navigation Interface

NAV_ON:	This signal is an input to the C161. When the RRASIC is operating there is sent a 30Hz square wave signal - via an transistor inverter stage - to the signal pin concerned. It should be low during power-down mode.
NAV_WAKE_UP:	This signal (active high) is an output from the C161. This signal is inverted by a transistor stage; thereafter it is used to wake up the RRASIC of the navigation system. The signal pin concerned should be low during power-down mode.
RESET_RR:	This signal is an output from the C161. Via a transistor stage this signal is inverted and it is used to reset the RRASIC of the navigation system. The signal pin concerned should be low during power-down mode.

Front Interface

FRONT_INT:	This signal is an input to the C161. It is used by the front unit to inform the C161 when the front wants to connect to, communicate with or disconnect itself from the C161. The signal pin concerned should be low during power-down mode.
ILLUM_DECK:	This signal is an output from the C161. It is used to control the power supply for the two LED's that light the opening where the CD is inserted. The signal pin concerned is high when no CD is inserted and low when a CD is present; this signal pin should be low during power-down mode.
RESET_FRONT:	This signal is an output from the C161. It is used to reset the 83E560 microprocessor of the front unit. The signal pin concerned should be low during power-down mode.

Other Interfaces

4MHz:	4MHz (clock) frequency derived from a crystal.
A1-A19:	Address bus lines.
CD_INT:	This signal is an input to the C161. It is used by the CD module to send an interrupt signal to the C161, when the CD module status is (has to be) changed. The signal pin concerned is active low.
D0-D7:	Data bus lines.
FAN_DIAG:	This is an analogue input to the C161. This input checks the fan current and -voltage. If, for any reason, the fan is defective, this is detected by the C161 and the power supply is controlled in such a way that the temperature does not rise too much.
FAN_ON:	This signal - active high - is an output from the C161. It is used to control the fan. When the signal is high, the fan is switched on. The signal pin concerned should be low during power-down mode.
ILLUM:	This signal is an input to the C161; it is derived from the LIGHTS signal coming directly from the main connector block. The signal level is relative to the status of the car lights, i.e. when the lights are ON, the signal pin concerned is high; it should be low during power-down mode.
MUX_CD:	This signal is an output from the C161. It is used to grant the control of the CD module to the RRASIC when a (navigation) CD_ROM is inserted, whereas the control of the CD module is granted to the C161 when a normal (audio) CD is inserted. The signal pin concerned should be low during power-down mode.
PCB_TEMP:	This is an analogue input to the C161. The 'RC3_REF' input is used for this purpose. Via this input, the average PCB temperature is measured with help of an NTC (pos.3915).
PHONE_MUTE:	This signal is an input to the C161. it is used to detect a phone call. This signal is the inverted version of the TEL_MUTE signal which comes in its turn directly from the main connector block. The active level (high or low) can be determined - via the 'init' mode - by the customer himself. The signal pin concerned should be low during power-down mode.
RDN:	This signal is an output of the C161. It is used to enable the Flash memory to have its contents read.
READYN:	This signal is an input to the C161. It is an indication that the Flash memory is ready to operate.
WEN2:	This signal is an output of the C161. It is used to enable the Flash memory to have certain data written into it.
XTAL2:	2nd crystal input; here it is connected to the 4MHz crystal clock frequency.

Flash Memory

The C161 microprocessor is supported by an 1MB Flash memory, type AM29F008B. Here the memory is used in so-called 'Word' configuration ('BYTE-N' pin is high). This implies the complete data bus width (DQ0...15) is used. There are 19 address lines; together with the 16 data lines this makes the total capacity 2^{19} x 2 x 8bits = 1MB.

Front Interface

Power Supply Specification

The front unit for MS4150RS/00/01, MS4200RS/00/01 and NAV-R45 are supplied with +5V(+5).

Front Current Consumption

Supply	Current Consumption
+5V(+5)	≤150 mA
+V_LAMP	≤350 mA

Control Signals and Bus Specification

Front Control Signals

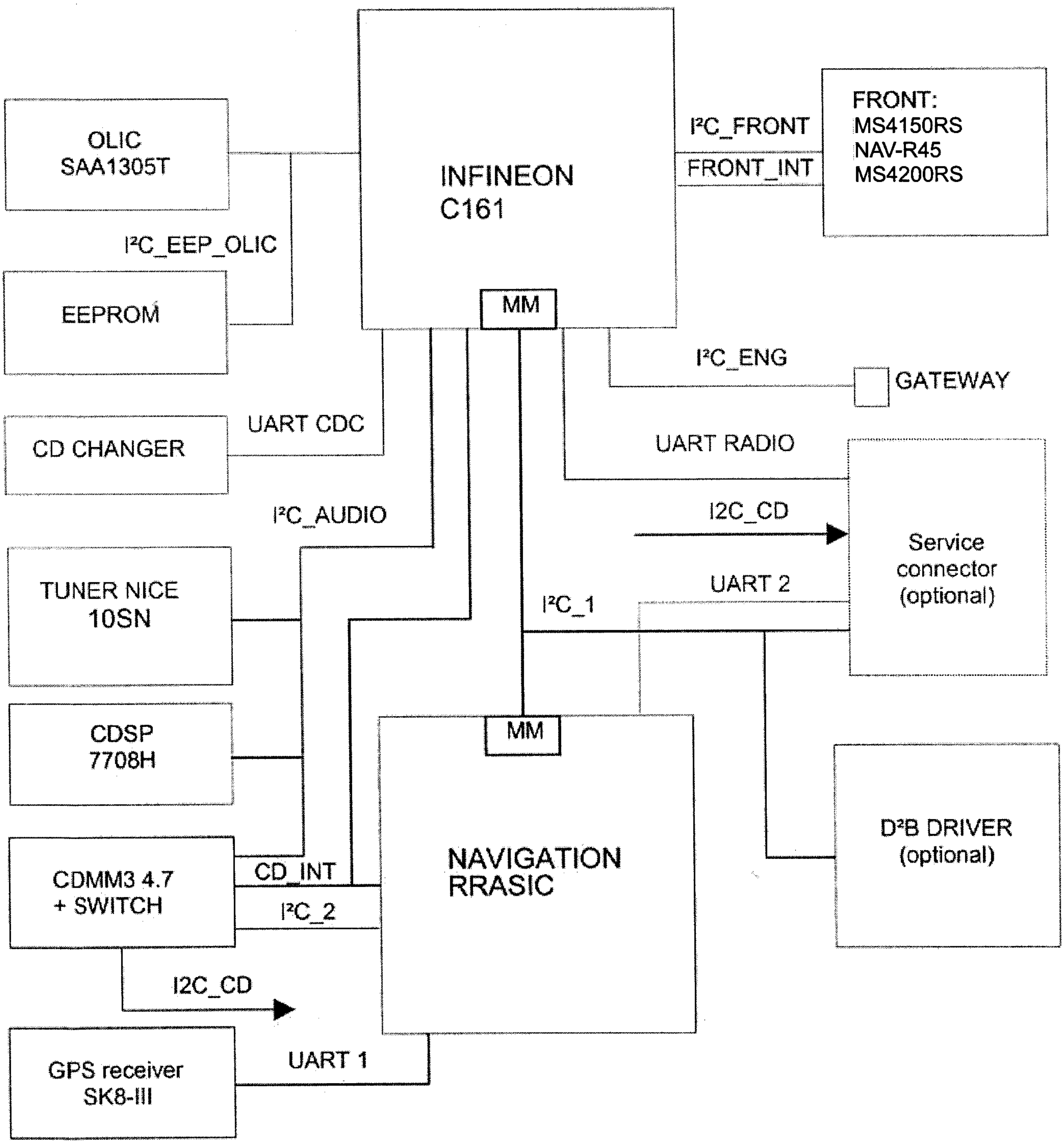
EJECTN:	This signal is an output to the RRASIC; it is the inverted version of the FRT_EJECT signal. It signs the RRASIC that the CD eject button has been pressed and the RRASIC stops the CD operation.
EL_ON:	This signal is an input from the C161. It is active high, used to control the supply (+V_LAMP) for the EL foil of the front (ON or OFF) (must be a low output in power down mode).
FRONT_INT:	This signal is an output to the C161. It is active low, used as request/interruption line from the front unit to the Mk4.5 (must be a low level in power down mode).
FRT_DETACH:	This signal is an output to the OLIC of the power supply. It informs if the MS4200RS/00-/01 front is detached.
FRT_EJECT:	This signal is an output to the OLIC of the power supply. It informs about the status of the "EJECT" button.
FRT_ON_OFF:	This signal is an output to the OLIC of the power supply. It informs about the status of the "ON OFF" button.
ILLUM:	This signal is an output to the C161. It signs the C161 about the car light and illumination conditions.
ILLUM_DECK:	This signal is an input from the C161. It is active high, used to control the supply of the 2 LEDs lighting the opening for CD (must be a low output in power down mode).
LED_FRONT:	This is the supply voltage for the 'Pilot'- and eject button LED's in the front unit; it comes from the OLIC.
LIGHTS:	This signal comes from the main connector block. It controls the front illumination in accordance with the 'night' conditions i.e. when the car lights are switched on.
RESET_FRONT:	This signal is an input from the C161. It is active high, used to reset the 83CE560 of the front (must be a low level in power down mode).
+V_LAMP:	This voltage, coming from the switch / stabilizer stage, is meant for all LEDs on the front unit, except the 'Pilot'- and eject button LEDs. This voltage is switched by the EL_ON signal.

Front Bus Specification

SCL_FRONT:	This signal is an input from the C161. It is a clock line of the software I^2C bus which connects together the front and the µP (externally pulled up by a 4.7kΩ resistor; it must be in low level in power down mode).
SDA_FRONT:	This signal is an input/output from/to the C161. It is a data line of the software I^2C bus which connects together the front and the µP (externally pulled up by a 4.7kΩ resistor; it must be in low level in power down mode).

Internal I²C / UART Busses

Bus Interface Block Diagram



OLIC
SAA1305T
I²C_EEP_OLIC
EEPROM
CD CHANGER
UART CDC
I²C_AUDIO
TUNER NICE
10SN
CDSP
7708H
CDMM3 4.7
+ SWITCH
CD_INT
I²C_2
I2C_CD
GPS receiver
SK8-III
UART 1
INFINEON
C161
MM
I²C_FRONT
FRONT_INT
FRONT:
MS4150RS
NAV-R45
MS4200RS
I²C_ENG
GATEWAY
UART RADIO
I2C_CD
Service
connector
(optional)
UART 2
I²C_1
MM
NAVIGATION
RRASIC
D²B DRIVER
(optional)

Hardware I²C Multi-Master Bus interface

SDA1:	This signal is an input/output of the C161. This is the 'Data' line of the hardware I²C bus that interconnects the RRASIC, the C161, the D²B controller and the test/service connector. The signal pin concerned is pulled up by a 2.2kΩ resistor and should be high during power-down mode.
SCL1:	This signal is an output of the C161. This is the 'Clock' line of the hardware I²C bus that interconnects the RRASIC, the C161, the D²B controller and the test/service connector. The signal pin concerned is pulled up by a 2.2kΩ resistor and should be high during

	power-down mode.
SDA2:	This signal is an input/output of the RRASIC. This is the 'Data' line of the hardware I²C bus that interconnects the RRASIC and the CDM-M3/4.7. The signal pin concerned is pulled up by a 3.3kΩ resistor and should be high during power-down mode.
SCL2:	This signal is an output of the RRASIC. This is the 'Clock' line of the hardware I²C bus that interconnects the RRASIC and the CDM-M3/4.7. The signal pin concerned is pulled up by a 3.3kΩ resistor and should be high during power-down mode.
CD_INT:	This is the MRQ (Master Request) line of the CD module. This line is inverted and connected to the RRASIC. It should be active low.

Software I²C C161 Master Bus Interface

The maximum transmission speed of this bus interface is 400kHz.
The Software I²C bus is defined as follows:

Device	Channel No.
EEP_OLIC	0
FRONT	1
ENG	2
AUDIO	3

For I²C addresses, refer to the concerned part elsewhere in this manual.

SDA_EEP_OLIC:	This signal is an input/output of the C161. This is the 'Data' line of the software I²C bus that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SCL_EEP_OLIC:	This signal is an output of the C161. This is the 'Clock' line of the software I²C bus that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SDA_FRONT:	This signal is an input/output of the C161. This is the 'Data' line of the software I²C bus that interconnects the Front unit and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.
SCL_FRONT:	This signal is an output of the C161. This is the 'Clock' line of the software I²C bus that interconnects the Front unit and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.
SDA_ENG:	This signal is an input/output of the C161. This is the 'Data' line of the software I²C bus that interconnects the Gateway and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SCL_ENG:	This signal is an output of the C161. This is the 'Clock' line of the software I²C bus that interconnects the Gateway and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SDA_AUDIO:	This signal is an input/output of the C161. This is the 'Data' line of the software I²S bus that interconnects the NICE tuner, the CDSP, the CDM-M3/4.7 CD module and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.
SCL_AUDIO:	This signal is an output of the C161. This is the 'Clock' line of the software I²S bus that interconnects the NICE tuner, the CDSP, the CDM-M3-4.7 CD module and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.
CD_INT:	This line is the MRQ line of the CD module and it is connected to the C161, when the CD module status is (has to be) changed.

Gateway Bus Interface (I²C_ENG)

SCL_ENG:	This signal is the 'Clock' line of the Gateway (used when servicing the PCB). This signal should be high during power-down mode.
SDA_ENG:	This signal is the 'Data' line of the Gateway (used when servicing the PCB). This signal should be high during power-down mode.

UART Interfaces

The following UART interfaces are used:

- RRASIC UART0 (UART1 in the block diagram; TxD1 and RxD1 in the circuit diagrams) - as an interface between the RRASIC and the GPS receiver.
  The following signals are used:

TXD1:	This signal transmits information to the GPS receiver. This signal should be low during power-down mode.
RXD1:	This signal receives information from the GPS receiver. This signal should be low during power-down mode.

- RRASIC UART1 (UART2 in the block diagram; TxD2 and RxD2 in the circuit diagrams) - as an interface between the RRASIC, the serial RS-232C driver (pos.7609) and the test/service connector (pos.1602).
  The following signals are used:

TXD2:	This signal transmits information to the RS-232C driver and to the test/service connector. This signal should be low during power-down mode.
RXD2:	This signal receives information from the RS-232C driver and from the test/service connector. This signal should be low during power-down mode.

- C161 UART1 (UART CDC in the block diagram; TxD1_RADIO and RxD1_RADIO in the circuit diagrams) as an interface between the C161 and the CD changer interface.
  The following signals are used:

TXD1_RADIO:	This signal transmits the data to the CD changer buffer; it is a standard serial output signal of the C161 microprocessor. This signal should be low during power-down mode.
RXD1_RADIO:	This signal receives the data from the CD changer buffer; it is a standard serial input signal of the C161 microprocessor. This signal should be low during power-down mode. Refer to the next paragraph ('CDC Bus Interface').

- C161 UART2 (UART RADIO in the block diagram; TxD2_RADIO and RxD2_RADIO in the circuit diagrams) as an interface between the C161 and the test/service connector (pos.1602).
  The following signals are used:

TXD2_RADIO:	This signal receives information from the C161; it is a standard serial output signal of the C161 microprocessor and it is connected to the TXD0 pin of the C161. This signal should be low during power-down mode.
RXD2_RADIO:	This signal transmits information to the C161; it is a standard serial input signal of the C161 microprocessor and it is connected to the RXD0 pin of the C161. This signal should be low during power-down mode.

CDC Bus Interface (UART_CDC)

The following signals are used:

CDC_TXD:	This signal transmits the data to the CD changer; it is the buffered version of the serial output TXD1_RADIO signal.
CDC_RXD:	This signal receives the data from the CD changer; it is buffered to the serial input RXD1_RADIO signal.

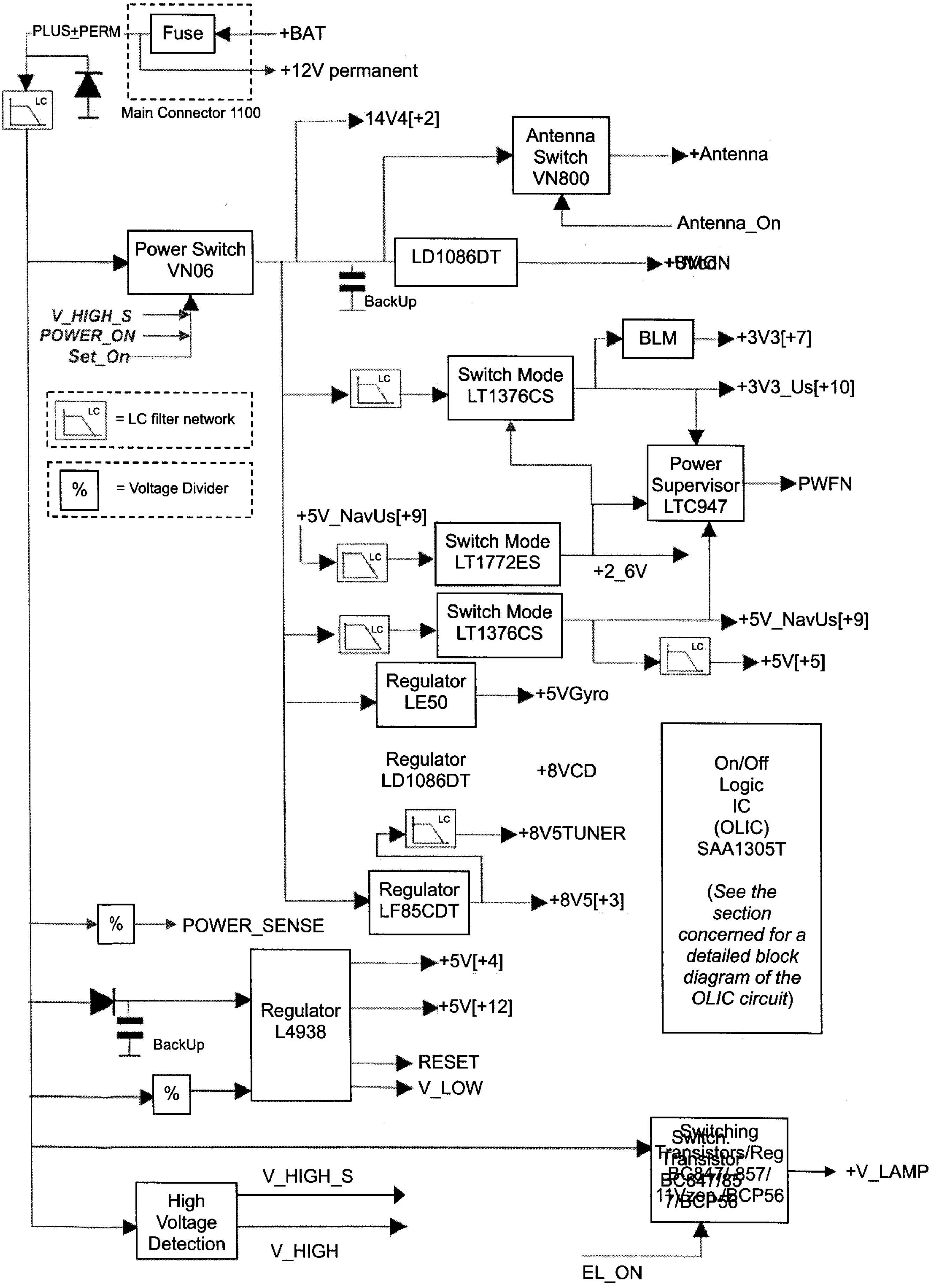
Bus Addresses

The table below gives an overview of all I²C addresses.

Master	Peripheral	Address (hex.)
µP Radio (C161)	EEPROM	AE
µP Radio (C161)	CDSP	38
µP Radio (C161)	NICE tuner	C2
µP Radio (C161)	Gateway	50
µP Radio (C161)	Front unit	62
µP Radio (C161) / Multi	RRASIC	60
µP Radio (C161)	OLIC	48
µP Radio (C161)	CDM-M3/4.7 module	30
RRASIC	CDM-M3/4.7 module	30
RRASIC / Multi	µP Radio (C161)	60
RRASIC	D²B	48

Power Supply

Power Supply Block Diagram


PLUS+PERM
Fuse
+BAT
+12V permanent
Main Connector 1100
LC
14V4[+2]
Antenna Switch VN800
+Antenna
Antenna_On
Power Switch VN06
LD1086DT
+8VCON
BackUp
V_HIGH_S
POWER_ON
Set_On
BLM
+3V3[+7]
Switch Mode LT1376CS
+3V3_Us[+10]
LC
= LC filter network
%
= Voltage Divider
Power Supervisor LTC947
PWFN
+5V_NavUs[+9]
Switch Mode LT1772ES
+2_6V
Switch Mode LT1376CS
+5V_NavUs[+9]
+5V[+5]
Regulator LE50
+5VGyro
Regulator LD1086DT
+8VCD
On/Off Logic IC (OLIC) SAA1305T
(See the section concerned for a detailed block diagram of the OLIC circuit)
+8V5TUNER
Regulator LF85CDT
+8V5[+3]
POWER_SENSE
Regulator L4938
+5V[+4]
+5V[+12]
BackUp
RESET
V_LOW
Switching Transistors/Reg BC847/857/ 11Vzen./BCP56
Switch: Transistor BC847/85 7/BCP56
+V_LAMP
V_HIGH_S
High Voltage Detection
V_HIGH
EL_ON

ON / OFF Stimuli

Several events are able - in some precise conditions - to switch ON or OFF the Mk4.5. These events are called 'stimuli' and are listed down below:

Definition of On/Off Stimuli

Signals	Description
FIRST CONNECTION	When the set is powered by the +PERM line, the set is switched ON
ON / OFF Button	This button is on the set front
+ACC	This input signal is from the vehicle key-switch
FRONT_FLAP_DOWN	When the flap is closed or released then an ON/OFF action is generated
FRONT_DETACH	This signal also informs the MS4200RS that the detachable part of the front has been removed
EJECT_CD	In precise conditions this event, which corresponds to a pressed «Eject» button, might switch ON the Mk4.5
CD_ON	When a CD is inserted into the CD drive the ON/OFF stage is informed and release an action which depends on the set context
V_LOW	This signal is active low and informs the ON/OFF stage about the state of the car battery level (depending on the

Note: In certain conditions (e.g. power-down mode) the set is NOT completely off. The 'OFF State' only indicates only the 'off' conditions from the user's view.

First Connection Stimulus

When the Mk4.5 is powered by the +PERM input line the for the first time, the set is automatically switched ON. This event is called 'First Connection'. After internal initializations the set goes directly to the power down mode, which corresponds to the OFF state, without any external stimuli.

ON/OFF Button Stimulus

When the Mk4.5 is supplied by the +PERM and the ON/OFF button on the front is pressed, the set is switched ON. Another press makes the set go to the power down mode again.

+ACC Stimulus

When the Mk4.5 is supplied by the +PERM (+12V), a high signal at the +ACC input stimuli switches ON the set. The set is switched OFF (from a user point of view) once this input signal becomes low.

Front Flap Down Stimulus

When the Mk4.5 is supplied by the +PERM, the set is OFF and the flap is released (by pressing the front button), the set remains OFF. But if the set is ON and the flap is released then the backlight is automatically switched OFF. If the flap is closed, the backlight is switched ON again.
MS4200RS/00/-01 front: The front is switched off if the front is released. The set remains switched on.

Front Detach Stimulus (MS4200RS/00/-01 only)

When the Mk4.5 is supplied by the +PERM, the set is OFF and the front detachable part is removed, the set remains OFF. However, if the set is ON and the front detachable part is removed then the set is switched OFF after some minutes. If the detachable part is put on back again, the set remains OFF.
If the detachable part is removed and another stimulus becomes active, the set remains OFF.

ON / OFF Logic Behaviour

From the user's point of view there are only two states: ON and OFF.
From an electrical internal point of view there are mainly three different ON/OFF states for the Mk4.5:

- The 'Stand-By' Mode for which the set has its minimum amount of current consumption. It corresponds to navigation part OFF, and radio part in power down mode. The set is completely OFF.
- The 'Degraded' Mode for which the set mutes the audio and user interface (MMI) is OFF. The radio and

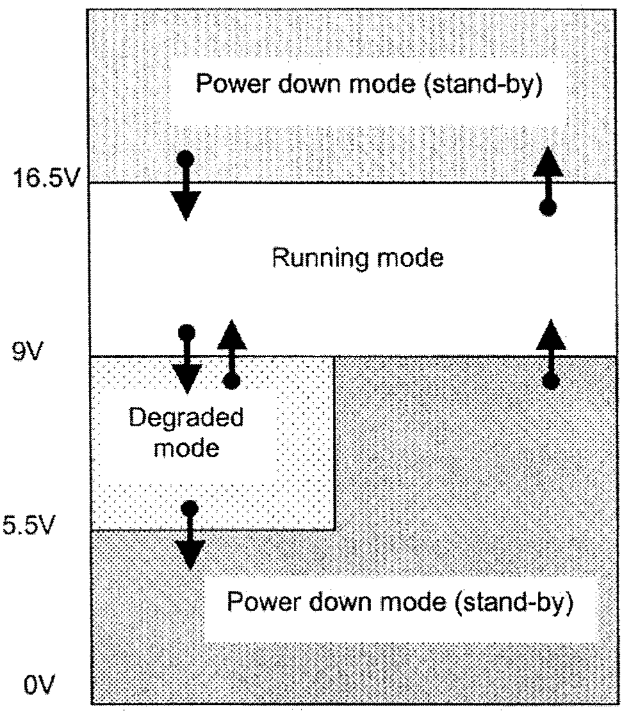
navigation µCs are running, and the internal switched power supplies are ON (the SET_ON signal ='1').

- The 'Running' Mode for which the set has its maximum of current consumption. It corresponds basically to the state where all devices could be active.

Currents of On/Off conditions

Mode	Conditions	Min.	Typ.	Max.	Unit
Stand-By	The set is in power down	-	-	2.0	mA
Degraded	Audio is muted / Display off	-	0.85	1	A
Running	-	-	-	10	A

The power supply functional table of the Mk4.5 is given hereafter.



Operating Voltages

Refer to the table below for the limits of the different 'Operating Voltage' conditions:

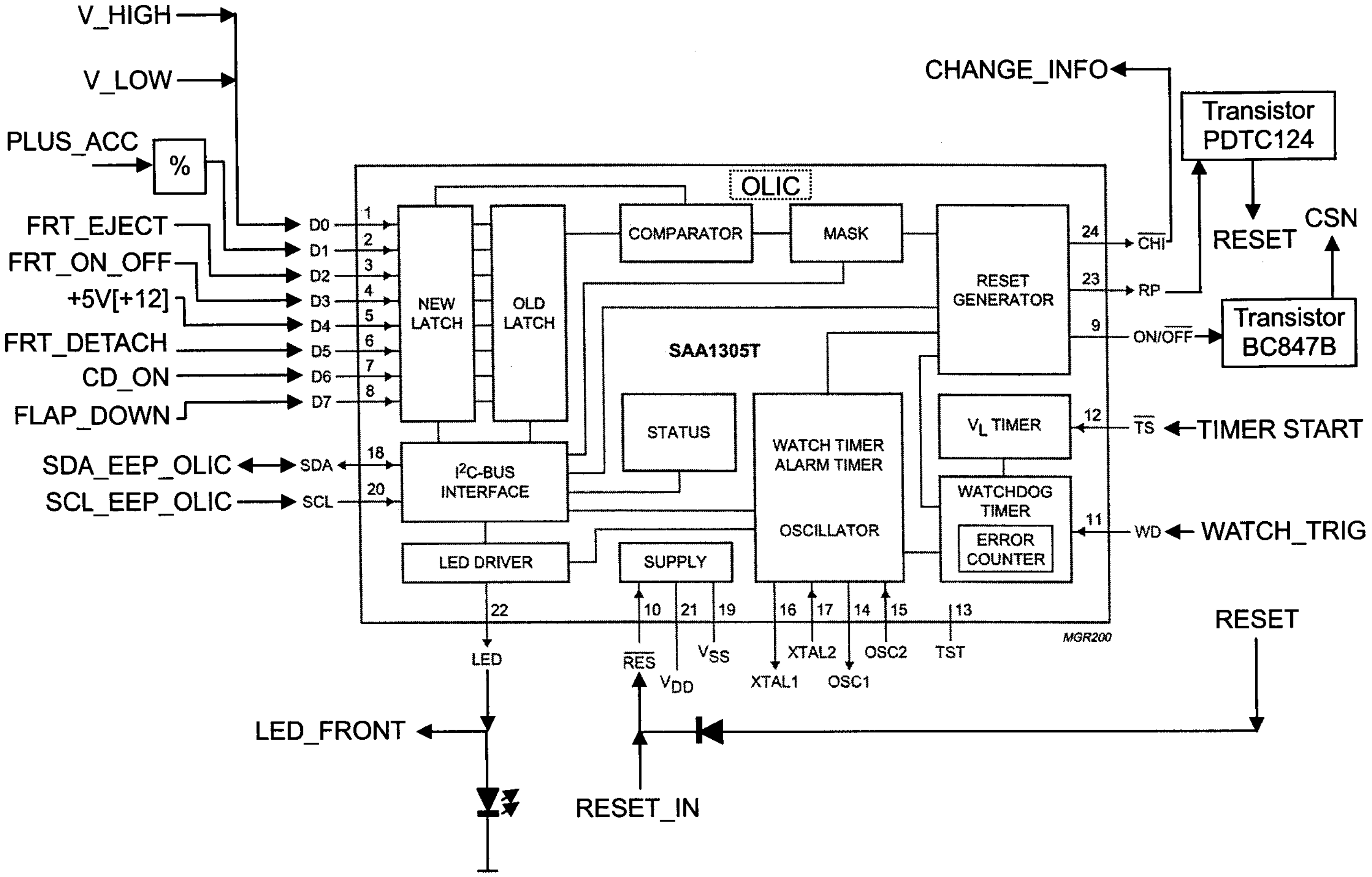
Battery Voltage	Internal Behaviour	End-User Behaviour
0V < U_{bat} < 5.5V	No functional	No functional operation
5.5V < U_{bat} < 9V	No functional or downgraded mode (see figure before)	No functional operation
9V < U_{bat} < 16.5V	Normal operation	Normal operation
16.5V < U_{bat} < 18V	Admit no functional operation	Admit no functional operation (no time limit)
18V < U_{bat} < 24 V	Admit no functional operation during 2 minutes	Admit no functional operation during 2 minutes
24V < U_{bat}	Admit possible destruction	Admit possible destruction

On-Off Logic IC (OLIC)

The OLIC that is used here is the SAA1305 type. It is used as an interface between the microprocessor C161 and the various power supply signals. The OLIC contains 8 inputs (D0-7) with Schmitt trigger- and clamp circuits.
The communication with the OLIC is performed via the I²C_EEP_OLIC bus with an operating frequency of 400kHz.
Additional functions of the OLIC are:

- LED blinking circuitry.
- Watchdog timer.

OLIC Circuitry Block Diagram


V_HIGH
V_LOW
PLUS_ACC
%
FRT_EJECT
FRT_ON_OFF
+5V[+12]
FRT_DETACH
CD_ON
FLAP_DOWN
SDA_EEP_OLIC
SCL_EEP_OLIC
D0
D1
D2
D3
D4
D5
D6
D7
SDA
SCL
1
2
3
4
5
6
7
8
18
20
NEW LATCH
OLD LATCH
COMPARATOR
MASK
OLIC
RESET GENERATOR
SAA1305T
STATUS
WATCH TIMER ALARM TIMER
OSCILLATOR
V$_L$ TIMER
WATCHDOG TIMER
ERROR COUNTER
I²C-BUS INTERFACE
LED DRIVER
SUPPLY
24
23
9
12
11
CHI
RP
ON/OFF
TS
WD
22
10
21
19
16
17
14
15
13
LED
RES
V$_{SS}$
V$_{DD}$
XTAL1
XTAL2
OSC1
OSC2
TST
MGR200
CHANGE_INFO
Transistor PDTC124
RESET
CSN
Transistor BC847B
TIMER START
WATCH_TRIG
RESET
LED_FRONT
RESET_IN

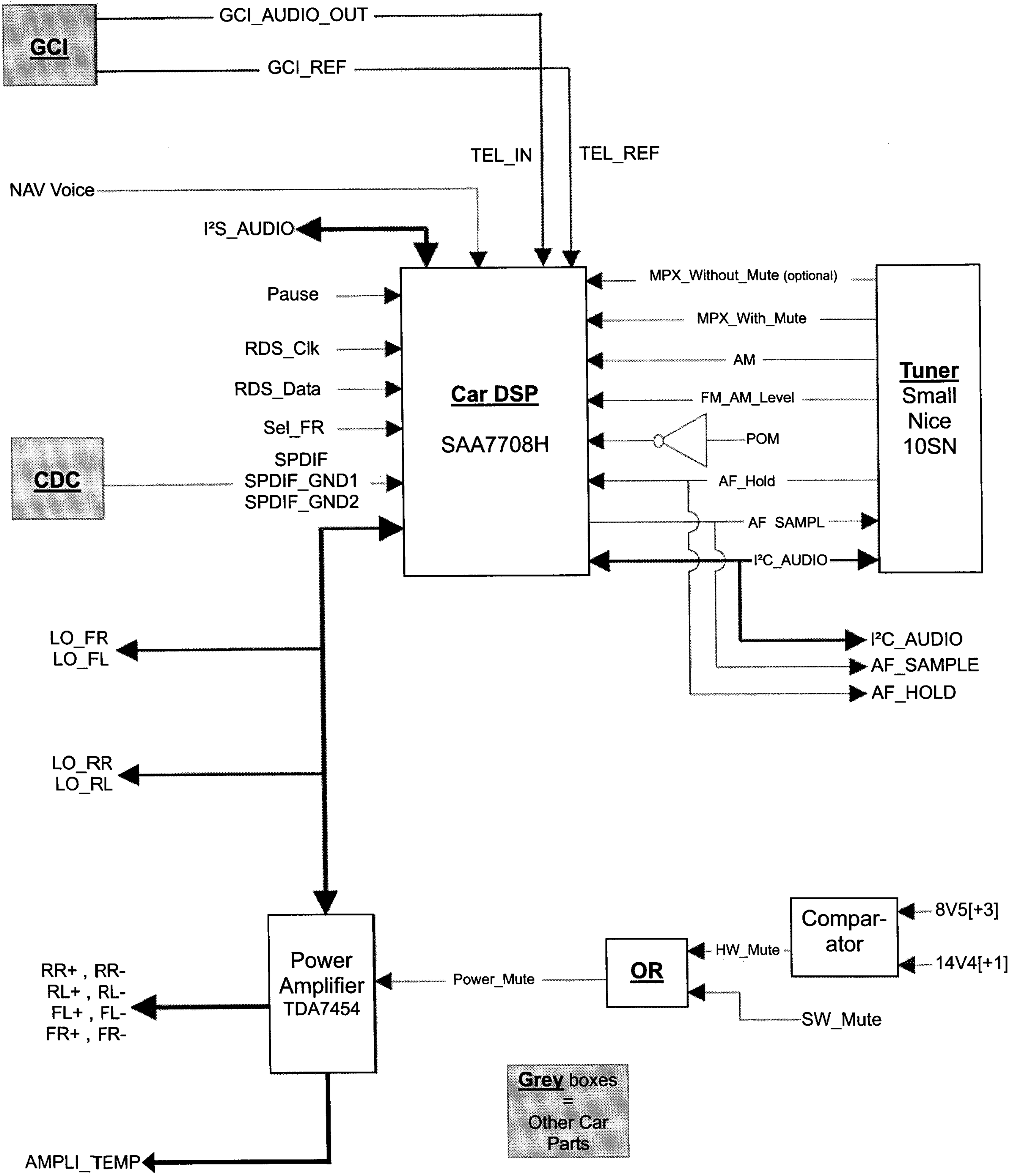
OLIC (On_off Logic IC) / Power Supply Interface Signal Description

ANTENNA_ON:	This signal is an input from the C161. This signal controls the switched +12.0V for an external electrical / electronic antenna or for an external amplifier (booster). The signal pin concerned is not pulled up; it should be low during power-down mode.
CD_ON:	This signal is an input from the CD module and an input to the OLIC. It signals the OLIC when a CD is inserted and has the OLIC taken the correct action depending on the current status of the power supply.
CHANGE_INFO:	This signal is an input of the C161 and it is derived from the OLIC. When the C161 is running, this signal goes high to interrupt the C161, each time an input of the OLIC is changing. This input is an interruption. The signal pin concerned should be high during power-down mode.
CSN:	This signal enables - via a transistor inverter stage - the Flash memory chip AM29F8 in case of a BSL (Boundary Scan Load).
EL_ON:	This signal is an input from the C161. It controls the transistor stage (BC847/-857/ BCP56) switch which controls in its turn the +V_LAMP voltage.
FLAP_DOWN:	This signal is an output from the Flap connector pos.1103 and an input to the RRASIC (via a transistor inverter stage) and an input to the OLIC. It signals the OLIC when the flap is either released or closed. Depending on the flap status, the front supply is switched either on or off.
FRT_DETACH:	This signal is an output from the Front unit and an input to the OLIC of the power supply. It informs if the MS4200RS/00-/01 front is detached.
FRT_EJECT:	This signal is an output from the Front unit and an input to the OLIC of the power supply. It informs about the status of the "EJECT" button.
FRT_ON_OFF:	This signal is an output from the Front unit and an input to the OLIC of the power supply. It informs about the status of the "ON OFF" button.
LED_FRONT:	This signal is an output of the OLIC. It controls the LED(s) in the front unit.
PLUS_ACC:	+12V switched voltage.
PLUS_PERM:	+12V permanent (battery) voltage.

POWER_ON:	This signal is an input to the high side switch VN06. It comes from the 'service connector' pos.1602. This line is used to switch on the supply directly e.g. during test procedures.
POWER_SENSE:	This signal is an analogue output to the C161 (*note: an ADC pin is needed*). This information is related to the power supply voltage at the input of the set.
PWFN:	This signal is an output to the C161. This signal goes low when the +5.0, +3.3V or 2.6V supply voltage(s) are below their specified limits. The signal pin concerned should be high during power-down mode.
RESET:	This signal is an in-/output to/from the OLIC; it is inverted via a transistor stage and that signal forms the 'Reset' input of the C161 (active low). this signal is also fed back to the supply RESET input of the OLIC, besides to the other devices that need the RESET signal.
RESET_IN:	This signal is an input to the OLIC. It comes from the L4938 regulator. When the input voltage is not within its limits, the L4938 sends a reset signal to the OLIC.
SCL_EEP_OLIC:	This signal is an input from the C161. This is the 'Clock' line of the software I^{2}C bus that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SDA_EEP_OLIC:	This signal is an input/output from/to the C161. This is the 'Data' line of the software I^{2}C bus that interconnects the EEPROM, the OLIC and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be high during power-down mode.
SET_ON:	This signal is an input from the C161. The signal switches on the VN06 and controls the switched voltages: +14.0V, +8.5V, +5.0V and +3.3V for the radio and navigation parts of the system. When 'SET_ON' is high, the voltage regulators of the power supply are switched on. The signal pin concerned is not pulled up; it should be low during power-down mode.
TIMER START:	This signal is an input from the C161. When a 'V-LOW' is detected, the C161 sends a pulse to the OLIC and goes into power-down mode. 250ms after the OLIC has generated a 'Reset' pulse, the C161 'wakes up' and checks the 'V-LOW' signal. If still low, the C161 generates another pulse and goes into power-down mode again. If 'V-LOW' is high, the C161 restarts from its previous configuration. This system is needed to store energy into the 'high-capacity 5V capacitor' for permanent voltage back-up. The 'TIMER START' signal pin should be high during power-down mode.
V_HIGH:	This signal is an output to the OLIC and the C161. As soon as the input voltage of the set exceeds approx. +17V, the V_HIGH signal goes low and interrupts the C161 to inform it of the power supply failure. This input is an interruption. The signal pin concerned should be high during power-down mode.
V_HIGH_S:	This signal switches off the high side switch VN06 directly, if the voltage rises above 17V. This is necessary because switching off via SET_ON is too slow.
+V_LAMP:	This supply voltage is used to control all LEDs on the front unit (except those of the PILOT and EJECT LEDs); its nominal value is 10.3V.
V_LOW:	This signal is an output to the OLIC and the C161. When the system input voltage comes below approx. +9.5V, the 'V_LOW' signal goes low and interrupts the C161 to inform the processor and the OLIC of the power supply failure. This input is an interruption. The signal pin concerned should be high during power-down mode.
WATCH_TRIG:	This signal is an input from the C161. This signal exists of a square signal with a frequency of 2Hz. This signal is used to re-load the watchdog timer of the OLIC and it exists only when the C161 is operating. The signal pin concerned should be high during power-down mode.

Audio Part

Audio Part Block Diagram


GCI
GCI_AUDIO_OUT
GCI_REF
TEL_IN
TEL_REF
NAV Voice
I²S_AUDIO
Pause
RDS_Clk
RDS_Data
Sel_FR
SPDIF
SPDIF_GND1
SPDIF_GND2
CDC
Car DSP
SAA7708H
MPX_Without_Mute (optional)
MPX_With_Mute
AM
FM_AM_Level
POM
AF_Hold
AF SAMPL
I²C_AUDIO
Tuner
Small
Nice
10SN
I²C_AUDIO
AF_SAMPLE
AF_HOLD
LO_FR
LO_FL
LO_RR
LO_RL
RR+ , RR-
RL+ , RL-
FL+ , FL-
FR+ , FR-
Power
Amplifier
TDA7454
Power_Mute
OR
HW_Mute
Compar-
ator
8V5[+3]
14V4[+1]
SW_Mute
AMPLI_TEMP
Grey boxes
=
Other Car
Parts

Car DSP

The Car DSP (Digital Sound Processor) used here is the (Philips) SAA7708H. The main parts of the Car DSP are:

- ADC (Analogue to Digital Converters) for converting the FM, AM, NAV_Voice and the GCI_Audio_out signal to a digital signal
- DAC (Digital to Analogue Converters) for converting the processed digital signals to analogue signals to be amplified
- Digital FM stereo decoder
- Digital FM interference suppression circuit
- RDS demodulator
- Two stereo CMRR (Common Mode Rejection Ratio) inputs
- Two mono CMRR inputs
- Mixing devices to mix more audio signals

The Car DSP is fully I²C controlled.

CDSP Interface

AF_HOLD:	This signal is an input from the C161. During the whole update procedure of the AF parameters (including the hidden mute), this signal has to be low. The signal pin concerned should be low during power-down mode.
AF_SAMPLE:	This signal is an input from the C161. When this signal goes low, the set is synchronized at the AF; the CDSP has to freeze the level, multipath etc. so that the C161 can read these values. The signal pin concerned should be low during power-down mode.
AM:	This signal is an input from the NICE tuner. It delivers the detected AM signal to the CDSP to be processed.
CLINB:	This is the 'Clock' line of the CD I²S bus.
DANB:	This signal is the 'Data' line of the CD I²S bus.
FM_AM_LEVEL:	LEVEL input pin; via this pin the level of the FM signal or level of the AM signal is fed to the CDSP; the level information is used in the CDSP for dynamic signal processing
MPX_WITH_MUTE:	This signal is an output of the NICE tuner and is fed to the CDSP input. This FM MPX signal is muted when e.g. the field strength of the signal becomes below a certain level (to prevent noise).
MPX_WITHOUT_MUTE:	This signal is an output of the NICE tuner and is fed to the CDSP input. This FM MPX signal is not interrupted because it contains also the RDS info (to make it possible to switch the tuner to another FM transmitter that transmits the same program).
PAUSE:	This signal is an output to the C161. This signal is active high, i.e. it becomes high as soon as a reception 'pause' is detected when the system is in 'FM' mode. The signal pin concerned should be low during power-down mode.
POM:	The 'POM' (Power-On Mute) signal is an input from the C161. This signal is used to mute the CDSP after switching on the power to avoid 'plops' due to the rising of the supply voltage. Besides, this signal can be used to make 'fast mutes'. There is a minimum time during which this signal has to be active. The signal pin concerned should be low during power-down mode.
RDS_CLK:	This signal is an input from the C161. This is the 'Clock' line of the serial bus used for transmission of the RDS information between the C161 and the CDSP. This output is an interruption. The signal pin concerned should be low during power-down mode.
RDS_DATA:	This signal is an output to the C161. This is the 'Data' line of the serial bus used for transmission of the RDS information between the C161 and the CDSP. This input is an interruption. The signal pin concerned should be low during power-down mode.
RESET_CDSP:	This signal is an input from the C161. It resets the CDSP. The minimum time duration of the 'low-status' of this signal should be 150ms, after the set is switched on. The signal pin concerned should be low during power-down mode.
SCL_AUDIO:	This signal is an input from the C161. This is the 'Clock' line of the software I²S bus that interconnects the NICE tuner, the CDSP, the CDM-M3-4.7 CD module and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

SDA_AUDIO: This signal is an input/output of the C161. This is the 'Data' line of the software I^{2}S bus that interconnects the NICE tuner, the CDSP, the CDM-M3-4.7 CD module and the C161. The signal pin concerned is pulled up by a 4.7kΩ resistor and should be low during power-down mode.

SEL_FR: This signal is an input from the C161. From the moment the tuner is synchronized at the AF to the end of the update procedure, this signal has to be high.
The signal pin concerned should be low during power-down mode.

SPDIF: This is the (Sony-Philips-DIFferential bus) digital output signal from the CD changer. It is fed via the main connector block to the CDSP CD-DATA input.

SPDIF_GND1: This is a ground terminal of the SPDIF digital input.coming from the main connector block.

SPDIF_GND2: This is a ground terminal of the SPDIF digital input coming from the main connector block.
Remark: in this configuration SDDIF_GND1 and -2 are interconnected.

TEL_IN: This signal is the output from the GCI (GSM Communication Interface) car phone set, fed to the CDSP input.
Note: In the Audio block diagram the GCI car phone output GCI_AUDIO_OUT is connected to the TEL_IN input.

TEL_REF: This is the reference connection of the GCI used to connect a car GSM handsfree set.
Note: In the Audio block diagram the GCI car phone reference GCI_REF is connected to the TEL_REF line.

VOICE: This signal is the output from the Navigation Voice Module, fed to the CDSP input.

VREFAD: Reference voltage for the analogue and digital CDSP circuitry.

WSINB: This signal is the 'Word Select' line of the CD I^{2}S bus.

Power Amplifier Interface

AMPLI_TEMP: This signal is an analogue output to the C161 (*note: an ADC pin is needed*). This signal detects the status of the PTC temperature sensor which is mounted close to the power amplifier.

HW_MUTE: This signal is an input from the comparator IC 7500-D. When both voltages (+14.4V and +8.5V) have reached their nominal values, the HW_MUTE signal becomes low. During the time the voltages don't have their nominal value yet, the output amplifiers are still muted to prevent 'plop' sounds in the speakers.
On the other hand, if one or both voltages exceeds its nominal value, the HW_MUTE signal is activated and the output amplifiers are muted. This prevents possible damage of the amplifiers and/or speakers.
The HW_MUTE signal is sent to a diode / transistor stage - that operate as an OR gate - ; that stage in its turn sends the 'Power_Mute' signal to the 'MUTE' input of the output amplifier stage.

SW_MUTE: This signal is an input from the C161. It is used to switch on of off the power amplifier muting. The power amplifier has to be muted after switching on the power and before the outputs are polarized, and just before switching off the power supply.
The signal pin concerned should be low during power-down mode.
The SW_MUTE signal is sent to a diode / transistor stage - that operate as an OR gate - ; that stage in its turn sends the 'Power_Mute' signal to the 'MUTE' input of the output amplifier stage.

Tone Control Specifications

- Efficiency of Bass control (80Hz boost): +12 dB ±2dB
- Efficiency of Bass control (80Hz cut): -12 dB ±2dB
- Efficiency of Treble control (10kHz boost): +10 dB ±2dB
- Efficiency of Treble control (10kHz cut): -10 dB ±2dB

Fader / Balance Specification

- Efficiency of Balance control: Digitally controlled: ≥30dB
- Efficiency of Fader control: Digitally controlled: ≥30 dB

Channel Tracking of Volume Control

- Digital: Max. volume to -50dB: limit = 2dB
  -50dB to ≤-60dB: limit = 3dB

Output Level Differences between Sources

FM mode in comparison with the others sources:
- AM mode: 0dB ±3dB
- CD mode: -2dB ±3dB

Loudspeaker Output Power Specification

The Mk4.5 is able to drive up to four different external 4Ω loudspeakers. In the Audio block diagram, these output signals are indicated as: FR+/-, FL+/-, RL+/- and RR+/-. The audio output interface, which is protected against short circuits, meets the following specifications:

Loudspeaker output specification

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Z_O	Output driving impedance	-		4		Ω
P_O	Output power (PQR)	THD = 10% @ 14.4V	16	18		W
f_r	Frequency response	-3dB	22		22,000	Hz
N	Audio output noise	At minimum volume		6	30	nW

Source Separation

See the table below for the specifications:

Source separation

Sources	Min. (dB)
FM / Line In	60
AM / Line In	60
CD mode	70

Audio Line Out Specification

The Mk4.5 has four different audio line outputs, which are protected against short circuits. In the Audio block diagram, these line output signals are indicated as: LO_FR, LO_FL, LO_RL and LO_RR. The line outputs meet the following specifications:

Audio Line-Out Specification

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Uout	Output voltage	-	0.5	0.7		V
Z_O	Output driving impedance	-	10			kΩ
N	Audio output noise	At minimum volume			10	µV
f_r	Frequency response	-3dB	22		22,000	Hz

TEL_IN Audio Input

The TEL_IN signal is an analogue audio input line for an external telephone or a mobile kit. The problem with such devices is that the hardware specification or their analogue audio output signal can be different from one device to the other.
For mounting, it is recommended to install the car kit as close as possible to the Mk4.5 and to use the same ground connection in order to reduce the common mode noise. The TEL_IN input maximum level is $1.4mV_{RMS}$ and the frequency bandwidth is: 25...18,000Hz.

Car Interfaces

Power Supply Specification

Permanent Power Supply Line

The power supply stage of the Mk4.5 filters, regulates and stabilizes the input supply voltages for the digital and analogue circuits and some internal and external devices that are listed below.

- GPS receiver
- Tuner
- CDM-M3 4.7/1 CD drive
- Gyro
- Navigation core
- Front display

These supply voltages, which are delivered in certain conditions when the set is switched on, are generated from the PLUS_PERM input line via a fuse directly connected to the car battery.

PLUS-ACC (Key Switch) Signal Specification

The +ACC input signal is basically the car key switch. This line is considered as a signal and not as a power supply line. Therefore no power is taken on this line. This signal is only used to 'wake-up' the Mk4.5.
The input voltage must lie between the limits: -0.5...+28Vdc.

Input Direction

The direction switch is a signal derived from the vehicle rear light. This signal is active high.
The input hardware interface of the direction signal is protected against double battery voltage and reverse polarity. For the specifications, see the table hereafter.

Electrical characteristics of active high Direction

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{T-}	Negative going threshold for active high switch	3.2	3.3	3.4	V
V_{T+}	Positive going threshold for active high switch	3.7	3.8	3.9	V
ΔV_T	Hysteresis (V_{T+} - V_{T-})	0.45	0.5	0.55	V
I_L	Input current low @ Ui = 0V		0.001	0.01	mA
I_H	Input current high @ Ui = 16V		1.2		mA
C_{in}	Input capacitance @ 1MHz		4700		pF
t_w	Pulse width	2			msec
U_i	Absolute maximum input voltage, during 60sec	-35		+35	V
I_i	Absolute maximum input current, during 60sec	-3.2		+3	mA

Lights

The Lights signal is an input for the vehicle light switch and active high.

The input hardware interface of the illumination signal is protected against double battery voltage. The hardware specifications of the input signal are given in the following table.

Electrical characteristics of Lights

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{T-}	Negative going threshold for active high switch	3.2	3.3	3.4	V
V_{T+}	Positive going threshold for active high switch	3.9	4.1	4.3	V
ΔV_T	Hysteresis (V_{T+} - V_{T-})	0.7	0.8	0.9	V
I_L	Input current low @ Ui = 0V		< 0.001	0.01	mA
I_H	Input current high @ Ui = 16V		26	50	mA
C_{in}	Input capacitance @ 1MHz		4700		pF
t_w	Pulse width	0.4			msec
Ui	Absolute max, during 60 sec.	-35		+35	V
I_i	Absolute max, during 60 sec.	-100		+50	mA

Tacho

The tacho interface is able to work with nearly all waveforms, levels and duty cycles, which one will find as speedometer signals in cars. Connectable are open collector circuits or other active switches and inductive sensors.

Electrical characteristics of the Tacho input

Symbol	Parameter	Min.	Typ.	Max.	Unit
	Sensitivity	2000 @3kHz		150 @10Hz	mV
F	Frequency range	1		3000	Hz
C_{in}	Input capacitance	-15%	300	+15%	pF
I_L	Input current low @ $U_i = 0V$		1.2		mA
I_H	Input current high @ $U_i = U_{bat}$	-5%	30	+5%	µA
U_i	Absolute maximum input voltage, during 60sec	-24		+75	V
I_i	Absolute maximum input current, during 60sec	-3		+0.05	mA

+Antenna Signal

The +Antenna signal is generated in order to control and supply several external devices. It is mostly used as a signal line and not as a power line. The maximal available current is limited (see the specifications below). When controlling external devices such as a power amplifier or a CD changer the +Antenna signal is high if it is active and low if no command is sent.

The +Antenna output signal is controlled by the radio part of the Mk4.5. It is protected against short circuits. When the radio is OFF or in the 'degraded' mode, the +Antenna is not supplied.

+Antenna current

Symbol	Parameter	Min.	Typ.	Max.	Unit
I_{max}				1000	mA
V_{drop}	500mA		0.3		V

Gateway Specification

The gateway is the so-called I²C bus that is used during production to test the Mk4.5 device and adjust some radio parameters: tuner, CDSP etc. Although not needed by the customer, it is mandatory to have this I²C present on the ISO connector block because the two signals of this I²C bus (SDA and SCL) must be attainable while the set is fully mounted.

Gateway bus frequency

Symbol	Parameter	Min.	Typ.	Max.	Unit
F	Bus frequency		70	100	kHz

The input hardware interface of the gateway bus is protected against double battery voltage.

CD Changer

The Mk4.5 can be interfaced with a CD changer that provides a buffered UART bus for communication and an SPDIF audio output signal.

Buffered UART Bus

The Mk4.5 communication interface with a remote CDC is compatible with the buffered UART bus, which is specified in accordance with the following table (see the next page):

Specification CDC UART (valid for TXD & RXD)

Symbol	Parameter	Min.	Typ.	Max.	Unit
t_r	Rise time	15	17.5	26	µs
t_f	Fall time	1	2	3	µs
A	Amplitude	11	11.2	11.5	V
Bd	Baud Rate		9600		bps

SPDIF Audio Signal

The Mk4.5 is able to receive - from an external CDC - a digital audio line SPDIF signal that meets the following specifications:

Specification SPDIF Signal

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_t	Rise time		35	70	ns
F_t	Fall time		35	70	ns
V_{out}	Amplitude	1	3.1	3.8	V
J_t	Phase jitter		10	15	%
f_s	Sample frequency		44.1		kHz
	Data rate		2.8224		Mbit/s

CDC Supply Output

The CDC supply is driven by the radio, but it isn't filtered. In other words: the +PERM power supply for the CDC is taken after the fuse of the Mk4.5 connector block. The fuse is designed to protect both the Mk4.5 and the CDC.

CDC Supply Current (Conditions: U_{bat} = 14.4V)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$I_{C\ MAX}$	Maximum current consumption			5	A

CD-ROM Drive

The CD drive is controlled via the I²C bus of the C161 or via the I²C bus of the RRASIC. The C161 selects with the signal MUX_CD which bus and which reset line (RST_CD or RST_CDN_DRIVEN) is connected to the drive. The drive has an additional 3rd line, CD_INT (communication request interrupt from CD player). The CD player is always slave. The CD_INT line is set low to signal the RRASIC that information is available. The I²C slave address is 30H (see the part: I²C Slave Addresses). For data output, the I²S bus (WSIN, DAIN, CLIN, EFIN) is used. It is buffered and the output level is shifted from 3.3V to 5V for the CDSP. The I²S bus is connected to the CD-data interface of the RRASIC and to the data interface of the CDSP. The specifications are:

- Type: CDM-M3-4.7/1
- Supply voltage: +8V_{cd}, 3V3+7

Pinning of CD Connector

The pin layout of this connector can be found in the section 'CONNECTIONS' elsewhere in this manual.

D²B Bus

The D2B controller is foreseen to connect an external communication box to the Mk4.5. The controller is connected to the I²C(1) of the RRASIC. The specifications are:

- Type: MSM6307GS-VK
- Package: SSOP32

RC5 Interface

There is a RC5 signal from the Mk4.5 or MS4200RS/00 /01 front. The front includes an infrared sensor and its own hardware interface converts the received signals into I²C frames. Therefore this source is not taken into account from a HW point of view.

RC3 Interface

A RC3 hard wired remote control can be connected to chamber C2 of the main connector. The function can be either measured with help of a separate +5V supply voltage or the voltage of the RC3 resistor divider can be measured with help of the AD port AN5 of the C161 (see 2nd table).

RC3 Voltages / Resistance (measured without system with use of a separate +5V supply; resistance is measured between the two RC3 connections)

	Voltage (V)			Resistance (Ω)		
Key	U_{min}	U_{nom}	U_{max}	R_{min}	R_{nom}	R_{max}
S1	0.68	0.74	0.81	77.9	82	86.1
S2	1.20	1.29	1.39	155.8	164	172.2
S3	1.77	1.88	2.00	269.8	284	298.2
S4	2.36	2.48	2.61	440.8	464	487.2
S5	3.02	3.14	3.26	754.3	794	833.7
S6	3.70	3.79	3.88	1400.3	1474	1547.7
"Diagn"	4.38	4.43	4.48	3490.3	3674	3857.7

RC3 ADC Voltages (measured at pin32 of the C161 microprocessor - port AN5)

	Voltage (V)		
Key	U_{min}	U_{nom}	U_{max}
S1	0.65	0.74	0.93
S2	1.14	1.29	1.46
S3	1.68	1.88	2.10
S4	2.25	2.48	2.74
S5	2.87	3.14	3.42
S6	3.52	3.79	4.07
"Diagn"	4.20	4.43	4.70

Telephone Input Lines

Telepbone Mute Input Signal

The telephone mute input signal TEL_MUTE is an input information that is received by an external telephone device such as a mobile or an other audio source to inform the Mk4.5 that its audio input signal TEL_IN is (or is going to be) active. This signal is active low: a low level is interpreted as a MUTE ON command and a high level as a MUTE OFF. The corresponding input interface is protected against double battery voltage- and short circuits. The following table gives the hardware specifications of the input interface:

TEL-MUTE Input Signal

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_{i\,L}$	Input current	$U_i = 0V$		250		μA
$U_{IH\ MIN}$	Maximum High input level	To have a 'Mute OFF' (if mute active at 0 in 'init mode')	2			V
$U_{IL\ MAX}$	Maximum Low input level	To have a 'Mute ON' (if mute active at 0 in 'init mode')			0.3	V

ROADRUNNER NAVIGATION PART

The main functions of the RoadRunner are:

- Input & processing of sensor data
- Navigation:
  - Dead reckoning
  - Map matching
  - Route planning
- Route guiding:
  - Display output
  - Voice output
- CD-loader, -player, -data retrieval
- Communication via RS232C bus (optional)

To support testability and maintenance, some additional functions are included:

- On-board diagnostic facilities
- Program loading via a "software-CD" and BST (Boundary Scan Test)
- BST
- For service purposes, the BST is accessibie via test points on side A and B
- Connector for BST & test box interface (option)
- RRASIC debug connector (option)

RRASIC Device

The RRASIC-1.2 is the core of the RoadRunner navigation computer. It provides the following functions:

- Toshiba TX39/H2 MIPS CPU core
- External Bus Inter-Face (EBIF)
- SDRAM controller
- NAND FLASH controller
- UART (4x) max. 19.2kbps
- SRAM
- Boot ROM
- BUS control unit
- Clock signals generator for the MIPS core (108.2 MHz)
- Interrupt Request Controller
- Reset module
- IDE controller
- I²C Bus controller (2x)
- Voice synthesizer controller
- Graphic display controller
- 2 timers
- 8 timer/compare units
- 2 counters
- Serial Peripheral Interface controller
- General purpose I/O devices (16x)
- RC5 interface
- BST interface (2x)
- Debug support unit
- Memory Management Unit
- I²S interface

The CPU is running at 108.2MHz. The instruction cache size is 16kbyte, that of the data cache: 8kbyte, that of the internal SRAM: 8kbyte and that of the internal boot ROM: 8kbyte. Moreover, the RRASIC comprises a multiply accumulate unit and an on-chip debug support. The CPU has a non-multiplexed 32bit data - and 32bit address bus. The clock frequency of 108.2 MHz is derived from a 6.7625 MHz oscillator. The 108.2MHz is chosen in such a way that the frequency is out of the FM radio band to prevent EMC problems.
The EBIF runs on 54.1 MHz.

CD Data Retrieval Controller

In the RR application, the parallel data output of the CDBD is used. For data input the Philips I²S format (as supported by CD player) is used.
The CDD is used to store data from a CD in the data memory. The CDD consists of two sub-functions:

- CD block decoder (CDBD)
- Data storage controller (DSC)

The CDBD receives the raw CD data serially via an I²S bus from the CD drive. This data is first de-scrambled and then checked for errors before it is passed to the DSC. The DSC then clusters the data in groups of four bytes and stores these groups autonomously in any part of the data memory.

SDRAM Controller

The SDRAM controller has the following features:
- Connection to single-data-rate SDRAM
- 4 memory channels with 32 bit width (*Note*: 16 bit width connectivity is not allowed)
- Dual G-bus connectivity
- Possibility of reading of 1, 4, 8, 16 or 32 long words (32-bit)
- Possibility of writing of 1 or 4 long words (32-bit)
- Different burst size on these busses is possible
- Built-in power-up logic
- Programmable refresh
- Two-long word (32-bit) write buffer for each G-bus

NAND Flash Controller

This controller has the following features:
- Full Smart-Media interface
- ECC calculation
- DMA (Ch-1) supported download mechanism

SRAM Controller

The internal SRAM has a size of 8kbytes, organized as 2048*32 bits. The SRAM controller supports single read and write accesses as well as burst read and write accesses. The SRAM can be accessed in byte mode, half word mode and word mode.

External Bus Interface

The External Bus Inter-Face (EBIF) allows external memories like Flash or SRAM to be connected to the RRASIC as well as external I/O devices. The EBIF also allows external master devices to be connected to the RRASIC.

Address Protection Unit

The address protection unit (APU) is used to define areas in the address range of 4GBytes, which can be protected against accesses in specific modes (kernel/user/read/write/fetch). For this purpose a number of registers is available to define these areas and to shield system memory from user accesses.
If the processor tries to access a memory area in protected mode, an exception will be generated. The status during the exception is logged in another set of registers.

Boundary Scan Test

The Boundary Scan test (BST) function enables the BST controller to test the interconnections between all pins of the (Toshiba) block and surrounding components.
The BST cells can be connected in three different ways:
1. Chain with only the NAND Flash pins
2. Chain with all pins except the NAND Flash pins
3. Chain with all pins

I²C Controller

Two I²C busses are in the RRASIC. The first one, I²C(1) is used as control/data bus and is connected to the D²B chip. The second I²C(2) bus is used as control bus and connected to the CD player and SOFAC. The I²C controllers operate with help of the 'master/slave' protocol which is fully in accordance with the I²C standard. The I²C slave addresses can be found in the part 'I²C Slave Addresses' of this manual.
The features are:

- I²C speed selectable in 'master' mode (100kHz, 400kHz)
- Data transfer from/to I²C controller via DMA

I²S Controller

The I²S input and -output controller form a 'glue-less' interface from the I²S-bus to/from the internal G-bus. The Philips-I²S protocol is supported.

Voice Syntbesizer Controller

This controller is used to transfer voice data from the memory to the voice synthesizer. The controller generates the main clock signal for the synthesizer.
If an error has occurred or the requested amount of data has been sent to the synthesizer, then an interrupt is generated if enabled.

SPI Bus Controller

This device is used to control the ADC in accordance with the SPI standard.

UART

Four UARTs are comprised in the RRASIC:

- UART0 (UART1 in the block diagram, TxD1 / RxD1 in the circuit diagrams) is used as GPS interface
- UART1 (UART2 in the block diagram, TxD2 / RxD2 in the circuit diagrams) is used as general purpose RS232C I/O device, connected to service connector 1602. One function is meant for diagnosis, the other is the CARIN Communication Interface (CCI)
- UART2 (not used here)
- UART3 (not used here)

Counters / Timers

Three timer units are used here:

1. Operating system timer, power supply hold
2. Watch dog timer and system tick
3. Timer with 8 compare units

Here follow some more details:

- All timers and compare units have interrupt capability
- All timers have programmable pre-scalers
- There are two independent Up / Down counters for tacho signal measurement
- Clock- and U/D-input signals are required

Clock Signal Generator

A PLL multiplies a 6.7625MHz oscillator frequency by 16, so the output frequency becomes 108.2MHz.

Interrupt Request Controller

This device has the following features:

- Fully programmable interrupt controller (enable; level)
- The IRC can handle 48 interrupt inputs

- The highest three interrupt inputs have failing edge detectors

The interrupt channels are defined as:

- INT0: 1PPS interrupt from GPS receiver
- INT1: Data logger interrupt

The interrupt inputs are software programmable as level or edge sensitive.

Navigation Interface

NAV_ON:	This signal is an output to the C161. When the RRASIC is operating there is a 30Hz square wave signal at the signal pin concerned. It should be low during power-down mode.
NAV_WAKE_UP:	This signal (active high) is an input from the C161. It is used to wake up the RRASIC of the navigation system. The signal pin concerned should be low during power-down mode.
RESET_RR:	This signal is an input from the C161. It is used to reset the RRASIC of the navigation system. The signal pin concerned should be low during power-down mode.

NAND Flash

This device is used to store instruction code, voice data and non-volatile data.
It is also used for a 'unique identifier number' for each navigation system. A 128 bit ID number is embedded in the extended block of SmartMedia before. The extended block can not be erased because it is an OTP (One Time Program) area.
Accommodation of a TSOP I 48 package for 128Mbit or 256Mbit NAND FLASH memory is foreseen. In the standard version, a 256Mbit NAND-FLASH memory is assembled. Some specifications:

- Type: TC58256AFTI YBJS or K9F5608U0B-YIB0
- Supplier: TOSHIBA or SAMSUNG
- Package: TSOP I 48
- Memory block size: (16k x 512)Bytes

The non-volatile storage is intended for the following data:

- Application (calibration, last car position, address book, etc.)
- Mk4.5 identification
- HW test bytes
- Statistical data (a.o. time of operation)
- Error logging
- Customer specific data
- VDO ID block
- Software loading block.

The NAND FLASH has an 8-bit I/O bus for multiplexed address, data and commands. The programming is done per 512-bytes page. The typical programming speed is 2 Mbyte/sec. The erasing is per block of 16 kbyte. The typical erasing time is 3 msec per block or 5 Mbyte/sec.
During start up, the code is read from the NAND FLASH and stored in SDRAM. The data can be read from NAND FLASH at >8Mbyte/sec.

SDRAM

The SDRAM is used for data and code storage. The memory of 32MByte is controlled via the SDRAM controller in the RRASIC. Specifications:

- Type: K4S281632C-TI75 (16MByte)
- Supplier: SAMSUNG
- Package: 54-pin TSOP (II)

More than one bank can be active. The data read speed is increased because the SDRAM controller makes use of this property. The clock frequency is 108.2MHz.
The data bus width is 32 bits. One type of the footprint is foreseen for 2x64Mbit, 2x128Mbit or 2x256Mbit. Default 2x128 Mbit is assembled.

Gyro and ADC

The gyro device is an angular rate sensor, assembled directly on the main PCB. The dynamic range is -80°/sec to +80°/sec. The bandwidth is 7Hz. The gyro is supplied with the +5V_ADC voltage derived from the +14V4+2 (filtered and switched car battery voltage). The gyro output signal is ±25mV/(degree/sec) with a DC level offset of 2.5V. This output signal is filtered with low pass filter and is converted from analog to digital data via a 12 bit ADC.
Horizontal and vertical mounting of the EWTS8 is possible via a mounting bracket. Also the Murata ENVO5-G can be mounted.
The ADC is controlled by the SPI bus of the RRASIC. The supply voltage of the ADC is connected to +5V_ADC for a minimum of ADC conversion errors. Specifications are:

- Type:	LT1860IMS8, 1 channel 12bit ADC
- Supplier:	Linear Technology
- Package:	MS08

Gyro Interface

Three versions of Gyro units can be mounted at the main PCB:

- EWTS82NA21 for the horizontal set
- EWTS82NA21 within a mechanical holder for the vertical set
- Murata ENV-OSG for the horizontal set

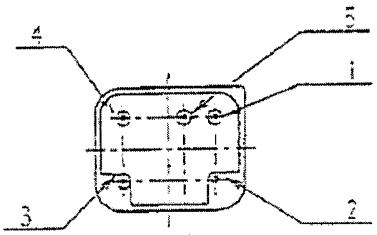
Gyro Matsushita EWTS82NA21

Specification of EWTS82NA21:

Parameters / Conditions	Min.	Typ.	Max.	Unit
Operating voltage	4.75	5.00	5.25	V
Zero point output	2.10	2.50	2.90	V
Current consumption (V_{cc}= 5V)		4.0	7.0	mA
Operating temperature	-40		85	°C
Start-up time			1.0	s

Pinning of EWTSB2NA21:

Pin	Signal
1	U_s
2	GND
3	GND (V_{pp})
4	V_{cc}
5	NC (DIAG)



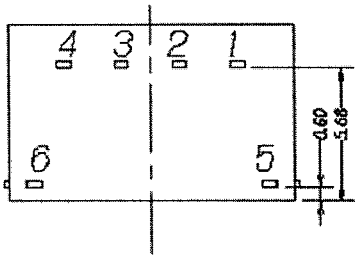
Murata ENV-05G (optional)

Specification of ENV-05G:

Parameters / Conditions	Min.	Typ.	Max.	Unit
Operating voltage	4.50	5.00	5.50	V
Current consumption (V_{cc}= 5V)			15.0	mA
Zero point output (velocity=0)	2.10	2.50	2.90	V
Operating temperature	-40		85	°C

Pinning of ENV-05G:

Pin	Signal
1	Sensor Output
2	GND
3	+Supply
4	NC
5	GND
6	GND



GPS Interface

The GPS antenna is connected at the rear side of the Mk4.5. The connector layout can be found in the section 'CONNECTIONS' elsewhere in this manual.
The GPS to RRASIC communication takes place via UART0. The 1PPS signal, used to synchronize the GPS messages, is connected to an interrupt input of the RRASIC. The GPS receiver logic is supplied with +3.3V and a backup supply (2.5...3.6V, 30µA max.) to supply the SRAM. Maximum data rate is 9600 baud.
Cold start: the typical time to first fix (initial position) is less than two minutes. To build up a complete almanac, the receiver needs 15 minutes. Warm start (power down for more than 60 minutes): time to first fix is less than 45 seconds. Hot start (power down for less than 60 minutes): time to first fix is less than 20 seconds. The GPS receiver is connected via a 8p micromatch flat cable.
The GPS antenna must meet the requirements fixed by the internal GPS SK8-III 3.3V receiver. The following table summarizes some of the required hardware specifications:

Electrical characteristics of GPS receiver

Symbol	Conditions	Min.	Typ.	Max.	Unit
$I_{CA(5V)}$	Current consumption (w/ antenna) without prime power			30	mA
$I_{C(3.3V)}$	Current consumption (w/o antenna)	-	55	250	mA
U_{Backup}	Backup power	2.5	-	3.6	V
I_{Backup}	Backup current consumption: with prime power without prime power			2 30	µA µA
U_s	Power supply (low noise amplifier)	3.0	3.3	3.6	V
$U_{s\,max}$	Absolute maximum without causing damage	-	-	5.5	V
F	L1 frequency band		1.5754		GHz
Gain	The GPS antenna is composed of a low noise amplifier (LNA) which provides gain to GPS		25		dB
C_l	Load antenna capacitance			0.3	µF
Sens	Sensitivity	30	≈45	60	dB

Voice Synthesizer

The output of the voice synthesizer is filtered and connected to the CDSP.
The voice synthesizer is based on the MSM6585, an ADPCM speech synthesis chip from OKI. The sample frequency is 16kHz, the number of bits per sample is 4. Its bandwidth is 6800Hz. The voice synthesizer controller - to transfer the data from the voice data file to the voice synthesizer - is part of the functionality of the RRASIC.

- Type: MSM6585 GS-AK
- Supplier: OKI
- Package: SSOP30

The output level of the voice synthesizer after filtering is $1V_{eff}$.

I^{2}C SLAVE ADDRESSES

Address (hex)	Name	I^{2}C of RRASIC	I^{2}C of C161
60	RRASIC	I^{2}C(1)	I2C_1
48	Control/Data D^{2}B	I^{2}C(1)	---
30	CDM M3	I^{2}C(2)	I2C_AUDIO
62	RRASIC	I^{2}C(2)	---
AE	EEPROM		I2C_EEP_OLIC
38	CDSP		I2C_AUDIO
C2	TUNER (NICE)		I2C_AUDIO
50	GATEWAY		I2C_ENG
62	FRONT		I2C_FRONT
60	OLIC		I2C_EEP_OLIC

CONNECTIONS

Main Connector Block

C1 - Line Out

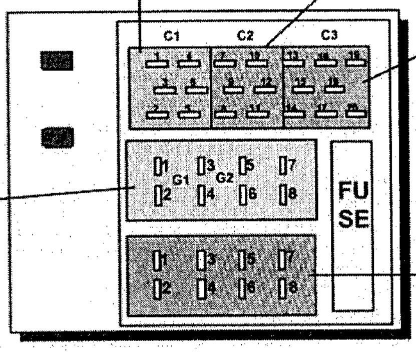
Pin	Signal
1	Rear Left
2	Rear Right
3	GND
4	Front Left
5	Front Right
6	Remote + (=A5)

C2-Phone

Pin	Signal
7	D2B-
8	Tel_In
9	Tel_Ref
10	D2B+
11	RC3-
12	RC3+

C3 - CD Changer Interface

Pin	Signal
13	CD UART+
14	CD UART -
15	CD UART GND
16	+12V Permanent
17	Remote + (= A5)
18	SPDIF Line
19	SPDIF GND
20	SPDIF GND



B - Loudspeaker

Pin	Signal
1	Rear RIGHT
2	Rear RIGHT Return
3	Front RIGHT
4	Front RIGHT Return
5	Front LEFT
6	Front LEFT Return
7	Rear LEFT
8	Rear LEFT Return
G1	Gateway 1
G2	Gateway 2

A - Car Interface

Pin	Signal
1	Speed
2	Direction
3	Tel_Mute
4	Supply 12V Battery (+12V perm.)
5	Remote + Antenna
6	Illumination
7	Ignition (+12V sw.)
8	Power Ground

Main Connector

Connector 1100				
Pin	**Conn.Block Pin**	**I / O**	**Signal**	**Comrnents**
1	-	-	Not used	-
2	-	-	Not used	-
3	-	-	Not used	-
4	C2-12	I	RC3	RC3 remote control input
5	C2-10	I / O	D2B+	High level voltage D2B-bus line
6	C2-7	I / O	D2B-	Low level voltage D2B-bus line
7	C2-8	I	TEL_IN	Telephone input
8	B-8	O	RL-	Loudspeaker rear left negative line
9	B-7	O	RL+	Loudspeaker rear left positive line
10	B-2	O	RR-	Loudspeaker rear right negative line
11	B-1	O	RR+	Loudspeaker rear right positive line
12	B-6	O	FL-	Loudspeaker front left negative line
13	B-5	O	FL+	Loudspeaker front left positive line
14	B-4	O	FR-	Loudspeaker front right negative line
15	B-3	O	FR+	Loudspeaker front right positive line
16	A-7	I	+ACC	Taken directly on the key switch of the vehicle or from a remote master device
17	A-5	O	+ANTENNA	Signal used to controt CDC, RDS antenna, external power amplifiers, etc.
18	A-4	I	PLUS_PERM	Fused battery power supply
19	-	-	Not used	-
20	A-8	O	POWER_GND	Ground of the power supply line
21	-	-	Not used	-
22	-	-	Not used	-
23	-	-	Not used	-
24	C1-5	O	LO_RF	Front right audio line out
25	C1-4	O	LO_FL	Front left audio line out
26	C1-2	O	LO_RR	Rear right audio line out
27	C1-1	O	LO_RL	Rear left audio line out
28	C2-9	O	TEL_REF	Telephone reference
29	-	-	Not used	-
30	A-6	I	LIGHTS	Illumination signal from vehicle
31	A-3	I	TEL_MUTE	Telephone mute input
32	B-G1	I / O	SDA_ENG	I^{2}C Lines of Gateway bus used for diagnosis or in production
33	B-G2	I	SCL_ENG	
34	A-1	I	ODOMETER	Speed signal from vehicle
35	A-2	I	DIRECTION	Direction switch signal from vehicle
36	C3-18	I	SPDIF	Numerical (digital) audio line out from the CDC
37	C3-19 and C3-20	I	SPDIF_GND1 and SPDIF_GND2	The two SPDIF grounds are connected together
38	C3-13	O	CDC_RXD	Lines for communication with CD changer
39	C3-14	I	CDC_TXD	
40	A-8	O	POWER_GND	Ground of the power supply line

Front Connector

Connector 1101			
Pin	**I/O**	**Signal**	**Comments**
1	O	Reset Front	Used to reset the front microprocessor
2	O	Pilot Light	Informs the front – vehicle lights are on
3	-	Ground ESD Bezel	Front bezel 0V connection
4	I/O	SDA Front	Data line of Front-Base unit I^{2}C bus
5	-	Ground	0V
6	I/O	SCL Front	Clock line of Front-Base unit I^{2}C bus
7	-	+5V	Switched and filtered +5V supply
8	-	Ground	0V
9	I	Front Request	Interrupt request line of front unit
10	I	Front ON / OFF	Signals that the ON/OFF button is pressed
11	I	Front Eject	Signals that the EJECT button is pressed
12	I	Front Detach	MS4200RS/00/01 front detach signal
13	-	Ground	0V
14	O	$+U_{Lamp}$ (EL_ON)	Power supply voltage for front back lighting
15	O	$+U_{Lamp}$ (EL_ON)	Power supply voltage for front back lighting
16	-	Ground	0V
17	(O)	LED_Front Blinking (only for Mk4.5)	Supply voltage for LED blinking - for Mk4.5
18	-	Ground ESD Bezel	0V
19	O	$+U_{Lamp}$ (EL_ON)	Power supply voltage for front back lighting

GPS Module Connector

Connector 1102		
Pin	**Signal**	**Comments**
1	n.c.	Reserved
2	+5V+5	Antenna supply 5V
3	RXD1	Port A (transmit)
4	$+U_{bup}$	Backup voltage
5	TXD1	Port A (receive)
6	1PPS	One-Pulse-Per-Second
7	+3V3+7	Supply voltage 3.3V
8	GND	Ground (power and signal)

Flap Connector

Connector 1103			
Pin	**I/O**	**Signal**	**Comments**
1	I	FLAP_DOWN	Informs the Mk4.5 that the front flap is open (down)
2	-	GND	Power Ground
3	-	GND	Power Ground

RRASIC Debug Connector

The RRASIC debug connector is not compatible with the SPIL3A debug connector.

Connector 1350			
Signal	**Pin**	**Pin**	**Signal**
PWFN	1	2	GDRESET
+3.3V	3	4	GDBGE
GSDI	5	6	GND
GDCLK	7	8	GND
GPCST0	9	10	GND
GPCST1	11	12	GND
GPCST2	13	14	GND
GPCST3	15	16	GND
GDSTAO0	17	18	GND
GDSTAO1	19	20	GND

BST and Ethernet Connector

Connector 1351			
Signal	**Pin**	**Pin**	**Signal**
TRST	1	2	$+U_{bfs}$
TDO	3	4	$+U_{bfs}$
TDI	5	6	HA[6]
TMS	7	8	HD[14]
TCK	9	10	HD[15]
NAND_WEN	11	12	HD[11]
RYBYN	13	14	HD[12]
PWFN	15	16	HD[7]
LASTN	17	18	HD[6]
R_WN	19	20	HD[10]
CE4N	21	22	HD[8]
HA[2]	23	24	HD[1]
HA[3]	25	26	HD[13]
HA[4]	27	28	HD[5]
HA[5]	29	30	HD[4]
NC	31	32	HD[9]
NAND_REN	33	34	HD[2]
NC	35	36	HD[0]
TESTBOX_INT	37	38	HD[3]

CD Module Connector

Connector 1501			
Pin	I/O	Signal	Comments
1	I	CD_ON	Insert detection switch line
2	-	GND	Ground
3	-	+8V$_{cd}$	+8V supply
4	O	SCL_CD	Clock I^{2}C bus
5	I/O	SDA_CD	Data I^{2}C bus
6	I	CD_INT	CD communication request interrupt
7	-	+3V+7	3.3V digital supply
8	O	RESET_CD	Reset for CD drive
9	-	GND	Ground
10	-	n.c.	
11	-	GND	Ground
12	-	n.c.	
13	-	GND	Ground
14	I	CLIN	Clock I^{2}S bus
15	-	GND	Ground
16	I	DAIN	Serial data I^{2}S bus
17	I	WSIN	Word clock I^{2}S bus
18	I	EFIN	Error flag

Service Connector

Connector 1602				
Pin	I/O	Signal Name	Pin Name	Description
1	-	-	-	n.c.
2	I	RESET	Reset Radio	Radio reset for BSL-Mode
3	O	TXD2_RADIO	TxD2 Radio	Serial communication for BSL- Mode
4	I	RXD2_RADIO	RxD2 Radio	Serial communication for BSL- Mode
5	I	D4	Programming	Enable BSL-Mode
6	-	-	-	n.c.
7	O	+5V+5	+5V	Regulated +5V power supply
8	I/O	SCL1	I^{2}C Nav Radio Clock	I^{2}C bus Nav and Radio communication
9	I/O	SDA1	I^{2}C Nav Radio Data	I^{2}C bus Nav and Radio communication
10	O	GND	Ground	Ground of power supply
11	I	CSN	CSN Flash	Flash chip select to use BSL-Mode
12	O	TXD2	TxD2 Nav	Serial communication with Nav
13	I	RXD2	RxD2 Nav	Serial communication with Nav
14	O	GND	Ground	Signal ground
15	I/O	SCL_CD	I^{2}C CD Clock	I^{2}C bus for emergency CD eject
16	I/O	SDA_CD	I^{2}C CD Data	I^{2}C bus for emergency CD eject
17	O	GND	Ground	Signal ground
18	I	RESET_CD	Reset CD	CD-Drive reset
19	I	POWER_ON	Power On	Power up main system
20	O	PLUS_ACC	Ignition	Ignition signal of vehicle

NICE Tuner Connector

Connector 1901			
Pin	I/O	Signal Name	Description
1	-	GND	Tuner ground
2	-	GND	Tuner ground
3	-	Not used	-
4	-	GND	Tuner ground
5	-	GND	Tuner ground
6	I	AF_SAMPLE	AF synchronization signal
7	I	AF_HOLD	AF mute signal during update
8	-	+5V(+5)	+5V supply voltage
9	O	AM	AM output signal from tuner
10	-	+8V5(+3)	+8.5V supply voltage
11	O	MPX_WITHOUT_MUTE	FM MPX signal (w/o mute) for RDS
12	-	GND	Tuner ground
13	O	MPX_WITH_MUTE	FM MPX signal (w/ mute) for RF
14	I	SCL_AUDIO	Audio I^{2}C bus serial clock
15	O	FM_AM_LEVEL	FM-/AM level detection signal
16	I/O	SDA_AUDIO	Audio I^{2}C bus serial data
17	-	GND	Tuner ground
18	-	GND	Tuner ground
19	-	Not used	-
20	-	GND	Tuner ground

GENERAL PURPOSE I/O'S AND INTERRUPT INPUTS

Name	I/O	GPIO	RRASIC I/O
CSB-INT	I	0	D²B controller interrupt
NAV-WAKE-UP	I	1	Wake-up command from C161 to RRASIC
n.c.	-	2	
RST-CDN	O	3	CDM-M3 reset
n.c.	-	4	
EJECTN	I	5	Eject signal from front
n.c.	-	6	
RST-D2B	O	7	Reset D²B controller
CD-INTN	I	8	CDM-M3 interrupt, active low
TESTBOX-INT	I	9	Test box interrupt, active low
n.c.	-	10	
FLAP-DOWN	I	11	Signal (active high) to detect open front
n.c.	-	12	
n.c.	-	13	
n.c.	-	14	
n.c.	-	15	
		Interrupts	
1PPS	I	INT0	IPPS from GPS, level converted from 5V to 3.3V
	-	INT1	connected to +3V3
DINTN	I	INT2	DUART interrupt, active low

TROUBLE-SHOOTING

In rare instances, your navigation radio may not function the way you expect it to. Before calling the service department, please read the operating instructions thoroughly and go through the following check list; it may be possible to quickly remedy an apparent malfunction.

Symptom	Possible Cause / • Remedy
General	
Navigation radio not functioning. No display.	• Check the fuse (unit and vehicle) and the connections (see installation instructions).
Audio or map CD rejected by the unit.	The CD may be dirty. • Clean the CD with a special CD cleaning fluid.
System switches off the sound during driving or display shows "PHONE IN/MUTE".	Speedometer signal connected to the wrong pin of the power supply connector. • See pin setting ISO chamber A in the installation instructions.
The operating panel of the unit feels warm.	No error. The unit always generates some heat.
The display shows "Temperature too high" and the volume is lowered.	An integrated safety circuit prevents the temperature in the unit from exceeding a certain value. • Allow the unit to cool (set lower volume) and wait until "Temperature too high" disappears from the display.
The egg timer appears and the CD cannot be ejected.	• Disconnect the power supply from the unit for at least one minute then reconnect it. If this does not work, return the unit to the Service department.
The telephone is not being detected even though it has been connected to the radio.	• Call up the initialisation menu, select "Telephone ON" and select "12 V" for Nokia hands-free units.
Unit not functioning / Not suitable for VW/Audi vehicles.	The power supply connector pin assignment for VW and Audi is not the same. • Use the VDO Dayton MA 1910 adapter for the connection.
Display still showing "INIT". Will not function.	The unit is faulty. • Take it to the Service department.
Radio	
Poor radio reception.	• Check if the antenna is completely extended and correctly connected. • Verify that the supply power negative pole (brown lead) is correctly connected to earth (vehicle chassis).
	If the unit is being installed in VW and Audi vehicles, you will need a power supply adapter for the antenna. • Use a suitable adapter (e.g. Votex).
The display shows the frequency instead of the station name.	The unit is set to a station that does not transmit RDS signals or the transmitter is too weak.
The required station cannot be set with automatic search.	The required station is too weak. • Set required station manually (manual tuning).
	• Check if the antenna is completely extended and correctly connected.
	"TA Scan" or "TMC Scan" has been activated. The radio only tunes to stations with traffic news or TMC information. • You may need to deactivate the "TA Scan" or "TMC Scan" function.
	Tuner standard (tuner grid) wrongly set (EUR / USA). • Check the "Tuner Grid:" option in the "Radio" menu.
The display shows "Tune to next TA station" and a warning tone sounds.	"TA Scan" is switched on; the selected station, however, is too weak or does not transmit traffic announcements (TA). • Deactivate the "TA Scan" function or set another station.
No traffic announcements are being made (CD, CDC or MUTE).	• Activate the "TA Scan" function in the "Information" menu.
CD Player / CD Changer	
Distorted sound / skips during CD play.	Player cannot read CD. CD is damaged or soiled.
CD player does not work.	In cold weather conditions, condensation may occur on the laser. • Wait approximately 5 minutes until the condensation evaporates.
No sound during CD play.	Some CDs contain multimedia data which is not recognized by the unit. • Select the next track until music is heard.
Problems with new copy-protected audio CDs.	Some copy protection procedures are incompatible with accepted standards for audio CD's. This is not a fault on the unit.

Symptom	**Possible cause / • Remedy**
Navigation	
Display shows "Please insert map CD".	The map CD is required for some functions in navigation mode and for route planning. • Insert the C-IQ map CD into the radio CD drive with the label facing upwards.
System reacts very slowly to entries or requires a long time for calculation.	You are in a very densely digitized area. The system requires more time to read large data quantities.
"Stand-by" is the only option selectable from the main menu.	• Wait for several seconds until the navigation computer is operational (options will be displayed in normal font).
The number of satellites in the "GPS/Compass" information menu is 0.	• Ensure that the GPS antenna is not being obstructed by any objects. • Move the vehicle outdoors if you are in a garage, a car park or a tunnel.
The directions cannot be heard or are very quiet.	• Press the Info button and set the required Nav volume.
Address cannot be stored in the address book.	Address book full. • Delete one or more no longer required entries from the address book.
Guidance is not accurate.	An inaccuracy of approx. 30 m is within the tolerance limits. • Please contact your authorized dealer if greater inaccuracies frequently occur.
	The displayed distance to the turning point is calculated to the centre of the junction (especially for extended junctions and main road exits).
Displayed position does not correspond to actual vehicle position.	Bad GPS reception for an extended period (e.g. as a result of poor reception conditions). The position is corrected automatically when adequate GPS reception returns. • If necessary wait a few minutes.
Directions do not correspond to the actual traffic conditions.	It is possible that the car position calculated by the navigation system is incorrect at this instant.
	The routing may have been changed and does not correspond with the information stored on the map CD.
The time in the "GPS/Compass" information menu is incorrect.	• Set the correct time zone in the "INITIALIZATION - CLOCK SETTINGS" menu.
Estimated time of arrival displayed on the guidance screen is incorrect.	• Check the time zone in the "INITIALIZATION - CLOCK SETTINGS" menu if GPS clock is set).
C-IQ	
During guidance, no traffic information is displayed, even though the selected radio station is transmitting TMC data.	You do not have a C-IQ Traffic info product activated. • Contact C-IQ service to activate C-IQ Traffic info contents.
No more directions shortly after crossing the border. Only the direction arrow is appearing in the guidance screen.	You are travelling in a country for which you don't have activated C-IQ map contents. • Contact C-IQ Service to activate map data for the required country.
Display shows "Please insert correct CD".	• Check if you have inserted a map CD which contains C-IQ data. Map CD's without C-IQ are not accepted by the system.

If the system doesn't operate properly yet after having done all these steps, it may be necessary to check the system by doing the steps as described in the section 'TESTS' hereafter. When these tests neither give the solution, the suspected part(s) has (have) to be repaired or replaced.
Consult, if necessary, the circuit diagrams.

TESTS

Test of Connectors & Pads

The following test connectors can be on the PCB as options:
- Debug connector: to connect the debug support unit of the TX39/H2 core, 1x20pin. See the part 'Connections' for the connector layout. *Note*: the RoadRunner debug connector pinning is NOT functionally compatible with SPIL3A debug connector.
- A 38-pin MICTOR connector for BST & test box interface. See the part 'Connections' for the connector layout. BST is also accessible via test pads at both PCB sides.

Testability and Maintenance

To support the testability of Mk4.5 during all phases of its life cycle, test facilities are built in. These facilities consist of test provisions in the product hardware, an optional test board and test software for the target processors and a PC.
For testability, following functions are included
- BST for interconnect testing
- TSW for interconnect and functional testing
- Gateway for access to the C161 microprocessor

To support testability and maintenance, the following functions are included:
- Test software loading via a "software-CD/DVD"
- Test software loading via BST
- Radio SW loading via UART2_RADIO (service connector)
- The CD drive is accessible via the service connector

The following connectors can be assembled:
- Connector for BST & test box interface. For service, both BST chains are accessible via test pads at both PCB sides
- Debug connector to RRASIC (assembly option)

On the RRASIC PCB, a connector can be soldered. On this connector, a RRASIC or a test-board with logic analyser connectors can be mounted.

Test Facilities for Service

- RS232C interface to RRASIC processor (driver RS232 not mounted)
- BST to download boot software in FLASH and to test proper assembly of RRASIC and memories
- BST and test software on the RRASIC processor to detect and localize assembly errors, and to download boot software in FLASH and to program the whole FLASH
- On-board device test by test software on the RRASIC processor which performs a functional test
- On-board burn-in test loop (without the need for a connected terminal)
- Test T1 for toggling ports of the C161
- Test T3 for testing busses of the C161
- Test T6 for testing the front keys and rotaries
- Test T7 for testing the front display
- Service connector (optional) for fault diagnosties and SW download. For the pin layout, see the part 'Connections' in this manual.

Checks

GENERAL FUNCTIONAL TESTS

1. Introduction

This section describes the checks and adjustments to be done after repair or replacement of the main board and/or peripheral devices. To have an exact overview and a complete description of the tests / commands mentioned here, refer to the CC-Mk3 TSW Service manual 4822 725 25495 and the supplement 3112 305 60291. One may also consult the 'General Check and Alignment Procedures' service manual 4822 725 25456.

'F...' in the descriptions hereafter indicate the test point where the signal concerned should be either connected or measured. Refer for the exact location of this measuring points to the circuit diagrams or PCB layouts.

2. RS-232C Interface

- Connect U_{bat} to pins A4 and A7 (resp. F32 and F34) of pos.1100.
- Connect pos.1100 pin A8 (F54) to GND.
- Connect an oscilloscope to F51.
- Use the TSW 'TCU' command ***30000019***.
- Check the high - and low level of the TxD signal:
  - For high-level: $-15V \leq TxD_{high} \leq -3V$; for low-level: $+3V \leq TxD_{low} \leq +15V$.

3. TSW Version, Flash ID and CRC

- Start the system in TSW mode or send the 'Get version number' command ***00000053***.
- Send the 'Flash ID' command ***01000200*** and then the 'Get result' command ***00000031***.
- The following table shows the relevant limits; the **bold** numbers change when a new TSW version is installed.

TSW Command	Result
TSW Release Version	0100**0020** (≡ version ≥ 1.60)
NAND Flash ID	0100020000000000**BDA5EC75000000**

4. ADC / Gyro Test

- Use the 'ADC LT1860IMS8 test' command ***01000500*** to test the Gyro.
- Execute the 'Get current gyro status' command ***20000091***.
- The monitor has to show an ADC value between 1,720 and 2,376 digits.
- Check the DC voltage of the gyro signal.
- The monitor has to show a value between 2,100mV and 2,900mV.
- Send the 'Stop gyro measurement' command ***20000092***.

5. Tacho Interface (mounting option for OEM)

- Check the voltage at the 'Speed / Odometer' input (connector block pin A-1 or PCB testpoint F16); it should be within +12.60 ...+14.40V.
- Connect the function generator to the Speed / Odometer' input.
- Set the function generator to 'Square wave burst' mode.
- Adjust the square wave for an amplitude of $8.0V_{p-p}$ @ f = 10Hz; set the 'burst' mode for 5 pulses.
- Set the 'Debug' level to '05' with help of the command ***0000000405***.
- Use the 'Start Odometer Counter' TSW command ***00000080***.
- Send five pulses by using the function generator.
- Use the 'Stop Odometer Counter' TSW command ***00000081***.
- The TSW monitor counter has to show the value of '*5*' (05hex).
- Use the 'Start Odometer Counter' TSW command ***00000080***.
- Send 50 pulses by using the function generator.
- Use the 'Stop Odometer Counter' TSW command ***00000081***.
- The TSW monitor counter has to show the value of '*50*' (32hex).

6. Tacho Interface (Trading System)

- Connect the function generator to the 'Speed / Odometer' input.
- Set the function generator to 'Sine wave burst' mode.
- Adjust the sine wave for an amplitude of $8.0V_{p-p}$ @ f = 10Hz; set the 'burst' mode for 10 pulses.
- Set the 'Debug' level to '05' with help of the command ***0000000405***.
- Use the 'Start Odometer Counter' TSW command ***00000080***.
- Send ten pulses by using the function generator.
- Use the 'Stop Odometer Counter' TSW command ***00000081***.
- The TSW monitor counter has to show the value of '*10*' (0Ahex).
- Adjust the sine wave for an amplitude of $8.0V_{p-p}$ @ f = 1kHz; set the 'burst' mode for 50 pulses.
- Use the 'Start Odometer Counter' TSW command ***00000080***.
- Send 50 pulses by using the function generator.
- Use the 'Stop Odometer Counter' TSW command ***00000081***.
- The TSW monitor counter has to show the value of '*50*' (32hex).

7. Direction I/O Test

- Connect an adjustable power supply voltage to pin A-2 of the connector block (PCB test point F15).
- Adjust the voltage to 2.0V.
- Use the 'Check / Set I/O Level' TSW command ***30002633***.
- Check if the monitor shows a value '1'(hex).
- Adjust the voltage to 4.3V.
- Use the 'Check / Set I/O Level' TSW command ***30002633***.
- Check if the monitor shows a value of '0' (hex).

8. D^2B Test

- Connect a VDO monochrome display (e.g.: MM3000/00) to the D^2B bus:
  - D^2B- : Connector block pin C2-7 / test point F46;
  - D^2B+ : Connector block pin C2-10 / test point F48 .
- The AN monochrome display D^2B address is '0x1CA'.
- Use the TSW 'D^2B Electrical Test' ***2000003301*** command.
- Thereafter, send the 'Get result' command ***00000031***.
- Check if no error is detected.

9. Voice Synthesizer Test

- To execute this test, a special gateway command is required to switch the CDSP to the 'Phone' input.
- If no gateway equipment is present, the signal can be measured at testpoint F97 of the main PCB.
- Use the TSW 'Set Voice' command ***0000000902***.
- Now a sine wave with a frequency of 1kHz should be measured at the testpoint c.q. heard by the loudspeaker.
- Measure the frequency; its value should be between 950...1,050Hz.
- Measure the output voltage; its value should lie between 805...855mV_{eff}.
- If needed, different frequencies can be measured c.q. heard by using the following commands:
  - ***0000000901*** : 100Hz ;
  - ***0000000903*** : 4kHz ;
  - ***0000000904*** : 8kHz ;
  - ***0000000900*** : no sound.
- Use the 'Stop' command ***00000006***.

10. Remote Control RC3 Test

- Connect a resistor of 3,674Ω (3.4kΩ + 274Ω) between pos.1100 pin C2-2 or F49 and GND.
- Measure the voltage at F50. Its value must lie between 4.2...4.7V.
- To check the operation of the buttons, perform the RC3 ADC test as follows:
- When pushing a certain button, check if the voltage at pin32 (port AN5) has the value as indicated in the table below:

Button	U_{min}	U_{nom}	U_{max}
S1	0.65	0.74	0.93
S2	1.14	1.29	1.46
S3	1.68	1.88	2.10
S4	2.25	2.48	2.74
S5	2.87	3.14	3.42
S6	3.52	3.79	4.07
„DIAGN“	4.20	4.43	4.70

- The voltage can be checked either with help of the Test Software features or by measuring the voltage at the pin concerned - or an other attainable point connected with that pin - with a digital multimeter.

11. CD (Module) Tests

- With the CD tests the following items are tested:
  - CD insert;
  - play (digital) data;
  - CD eject.
- Insert the CARiN test CD into the slot and check if the system is switched on and the CD is loaded.
- Use the TSW 'Dynamic Behaviour' test:
  30000B12000000020200
  for APM 7112 235 1340 or -1402
  OR
  30000B12000000020201
  for CARiN II rel.1.2 CD .
- Check if no error is shown at the monitor.
- Use the TSW 'Eject' command ***00000007***.
- Check if no error is shown at the monitor and the CD is ejected without problems.
- Use the TSW 'Get CD Hardware Status' command ***00000049***.
- Use the TSW command ***00000031*** to read out the results from the previous test.
- Instead of the two previous commands, the 'DVD / IDE Get device info' command ***01000003*** can be used.
- Check if the result string reads as follows: *000000310000000200000002* (= no CD in the CD module).

12. GPS Test

- Connect antenna to the GPS receiver.
- Use the TSW 'GPS' test command ***2000001F*** (presence of '1PPS' signal).
- Send the 'Get result' command ***00000031***.
- Use the 'GPS Rx Health' test command ***2000001B***.
- Send the 'Get result' command ***00000031***.
- Check if no error is shown at the monitor.
- For relevant limits, see the next table:

Signal	Result
GPS Test	2000001F00000000
GPS Rx Health Test	2000001B000000**00**000000**00**00000000

- Use the 'Get GPS version number' command ***0000011B***. Instead, the 'Free Access' command: 'Get GPS Rx SW version' can also be used by sending the following string ***00000040000500FF04101F1003***.
- The TSW should respond with the following string: 45**0108**XXXXXXXXXXXXXX65 (≡ SW version '01 08'.
- Use the 'Get GPS position' command ***2000001E***. Thereafter send the 'Get result' command ***00000031***.
- Now the TSW should display the current position coordinates.

13. Change Start-Up Application

- Use the TSW 'Clear TSW Flag' command ***010006000001***.
- Switch the system off by disconnecting U_{bat} from pos.1100 pin A-7.
- Thereafter, disconnect U_{bat} from pos.1100 pin A-4.
- After switching on the power again, the system has to start up with its normal application software.

14. Telephone IN / -Mute Test

- Connect 4Ω loads between the following pins:
  - pos.1100 between pins B-1 and B-2;
  - pos.1100 between pins B-3 and B-4;
  - pos.1100 between pins B-5 and B-6;
  - pos.1100 between pins B-7 and B-8.
- Switch the set to FM mode.
- Apply a signal of 1kHz @ $1V_{rms}$ to pos.1100 pin C2-8.
- Adjust the volume in such a way that the reference output level has a value of 0dB at the following conditions:
  FM: U_{HF} =1mV, f=1kHz, Δf=22.5kHz @98.0MHz.
- Connect pos.1100 pin A-3 to GND at keep it grounded during this test.
- Check if the set goes into the 'Phone in' mode.
- Measure the output signal; its value should lie between 1.8V...2.2V (≡+5...+7dB)

CD / AF TESTS

1. Playability Test

To test the playability of the CD module, the following test discs should be used:

- Eccentricity disc 150µm - 4822 397 30279 ;
- Skew disc - 4822 397 30277 ;
- Test sample disc - 4822 397 30245
  OR
  Sub chassis VII A - 7104 099 28350 .
- Insert the eccentricity disc.
- Play track 1 (or more if necessary).
- No audible wow, flutter or other deviating sounds may be heard.
- Insert the skew disc.
- Play track 9 (or more if necessary) for at least 4 seconds.
- No audible wow, flutter or other deviating sounds may be heard.
- Insert the test sample disc OR sub chassis VII A disc.
- Check loading, display and number of track and total time.
- Select track 1 and listen for at least 5 seconds.
- Check for good sound quality and no noise.
- Select track 2.
- Check for a good sound reproduction both for the left and right channel.
- Select track 9 (sample disc) / track 8 (sub chassis VII A disc).
- Check for good sound quality, no jump and no noise.

2. AF Tests

To test the AF part in combination with the CD module, the 'Audio Signal Disc 1' - 4822 397 30184 is required.

- Insert the audio signal disc 1.
- Set the bass, treble, balance and fader controls in their centre position.
- Switch off the loudness function.
- Use a suitable 1 kHz band-pass filter.
- Switch OFF the compression mode.
- Select track 67 (1kHz - only left channel).
- Measure the output level at the loudspeaker and use this level as reference value.
- Measure the level at the right channel c.q. loudspeaker.
- Check if the values differ at least 65dB.
- Repeat the same procedure as follows:
- Select track 71 (1kHz - only right channel).
- Measure the output level at the loudspeaker and use this level as reference value.
- Measure the level at the right channel c.q. loudspeaker.
- Check if the values differ at least 65dB.
- Connect a suitable distortion meter or an oscilloscope across an LS load or line output.
- Use a 20kHz low-pass filter.
- Select track 15 (1kHz test tone).
- Measure the output level and use this level as reference value.
- Measure the total harmonic distortion (THD) by either reading the meter or determining from the oscillogram.
- Repeat this procedures for tracks 9 - 23.
- The overall THD should be < 0.3%.
- Select track 1.

- Measure the output level and use this level as reference value.
- Select track 49.
- Measure the output level.
- The difference between the levels of track 1 and track 49 should be at least 80dB (S/N ratio).
- Select track 32.
- Adjust the volume at the reference value of 0dB.
- Select tracks 51, 52 and 53.
- Check if for these three tracks the level is -10±2dB.

3. AF Power Test

- Connect a distortion meter and an AF power meter or an oscilloscope to the loudspeaker output.
- Adjust the tuner to 98.0MHz.
- Apply a modulation signal of 1kHz and a frequency deviation of 22.5kHz.
- Adjust the AF level until the distortion meter reads 10%.
- Read the power value or determine it from the oscillogram.
- The AF power should be at least 16W (typ. value 18W).

4. Audio Control Test

- Select the FM mode and apply a signal with the following specifications:
  - 98.0MHz; U_{HF} =1mV
  - Pre-emphasis = 50µs (≡20kHz);
  - Bass/Treble in centre position;
  - Loudness off.
- Adjust the 0dB reference level at 1kHz.
- Check if the following values are reached at the frequencies concerned:
  - 20Hz: -1.5±1dB;
  - 100Hz: 0±1dB;
  - 10kHz: 0±1dB;
  - 16kHz: -3±1dB.

5. Tone Control Response Test

- Select the FM mode and apply a signal with the following specifications:
  - 98.0MHz; U_{HF} =1mV
  - Pre-emphasis = 50µs (≡20kHz);
  - Bass/Treble in centre position;
  - Loudness off.
- Adjust the 0dB reference level at 1kHz and with an amplitude of 1.4V
- Check if the following values are reached at the frequencies concerned (Bass/Treble to maximum):
  - 80Hz: +12±2dB;
  - 10kHz: +10±2dB.
- Check if the following values are reached at the frequencies concerned (Bass/Treble to minimum):
  - 80Hz: -12±2dB;
  - 10kHz: -10±2dB.

6. Line Out Test

- Connect 10kΩ load resistors to the following line outputs:
  - pos.1100: between pins C1-1 and C1-3;
  - pos.1100: between pins C1-2 and C1-3;
  - pos.1100: between pins C1-4 and C1-3;
  - pos.1100: between pins C1-5 and C1-3.
- Select FM mode and apply the following signal:
  FM: 98.0MHz; f_{mod} =1kHz; Δf=11.25kHz
- Set the volume to its maximum value.
- Check if the level of the output signals meet the following value: 500mV±2dB.

RADIO TESTS

1. Radio FM Tests

Normally these tests should only be executed after the tuner has been replaced. The principal tests are:

- 'α - 3dB' (aerial sensitivity) test ;
- S/N ratio test ;
- Crosstalk / SDS test .

The FM aerial sensitivity is checked as follows:

- Connect an AC millivoltmeter across the line outputs.
- Inject - via the FM aerial matching circuit (see figure) - an RF signal of 98.0MHz / 1mV / 1kHz AF frequency and proceed maximum tuning of the receiver.
- Align the volume control of the set for a reading of 0dB (≡0.5W@4Ω).
- Decrease the injected RF signal level until the meter gives a reading of -3dB.
- The RF value should have a value that lies between 5.0 and 10.0µV (typ. value 7.1µV).

The S/N ratio test is executed as follows:

- Connect load resistors across the loudspeaker outputs and use a suitable 19kHz notch filter.
- Inject a signal of 98.0MHz, Δf = 22.5kHz, AF 1kHz and an RF amplitude of 1mV.
- Adjust the volume potmeter until the output power is 0.5W.
- Switch off the modulation signal.
- Read the output values again.
- Now the output difference between modulated - and unmodulated signal should be:
  - > 60dB for mono;
  - > 55dB for stereo.
- Adjust the RF level in such a way that:
  - $output_{modulated}$ = 0dB;
  - $output_{unmodulated}$ = -26dB.
- Read the RF level; its value should be <2.5µV.

The crosstalk / SDS test is executed as follows:

- Connect AC millivolt meters across the LS loads of both left and right channel.
- Use a suitable 1kHz band-pass filter.
- Inject an RF signal having a frequency of 98.0 MHz with a modulation signal of 1mV at an AF frequency of 1kHz and tune the receiver to this frequency.
- Adjust the balance control for an equal reading of both meters.
- Adjust the volume control for an output level of 0dB.
- Switch the 'R' signal off and read the value at the L and R output.
- The level difference between both signals now should have the value of <30dB.
- If necessary, repeat the complete procedure with only the R channel switched on at the generator. Measure now at the L output.
- Now adjust the RF level in such a way that:
  - $\text{output}_{\text{modulated}}$ = 0dB;
  - $\text{output}_{\text{unmodulated}}$ = -10dB.
- Now the RF level value should be between 100 and 200μV.
- Repeat this procedure if necessary by interchanging both stereo channel inputs.

2. Radio AM Tests

Normally these tests should only be executed after the tuner has been replaced.

The principal tests are:

- S/N ratio test ;
- Noise limited sensitivity S/N test.

The S/N ratio test is executed as follows:

- Inject an RF signal signal having a frequency of 1,053kHz / m=30% / f=1kHz and an RF value of 2mV to the aerial input via the AM aerial match (see figure).
- Tune the receiver to the injected frequency and check the behaviour of the RF output signal.
- Switch off the loudness function if possible.
- Adjust the volume control for a reading of 0dB.
- Switch off the RF modulation signal and read the AF output level in dB related to AF level during modulation on.
- Now the differences between the levels of the modulated - and unmodulated outputs should be > 48dB.
- Repeat this procedure for the LW wave band with the following RF signal: 162kHz / m=30% / f=1kHz / U_{RF} = 2mV.

The 'noise limited sensitivity S/N' test is executed as follows:

- Inject an RF signal signal with a frequency of 1,053kHz to the aerial input via the AM aerial match (see figure).
- Tune the receiver to the injected frequency.
- Switch off the 'Loudness' function if possible.
- Adjust the volume control for a reading of 0dB.
- Switch off the RF modulation signal and read the AF output levels in dB related to AF level during modulation on.
- Adjust the RF input level until the ratio of the AF output signal during modulation on' and 'modulation off' is 26dB (keep the AF output at 0dB during 'modulation on'!).
- This RF level now is the 'noise limited sensitivity'. It should be < 31.6μV.
- Repeat this procedure for:
  - LW - 162kHz; RF level < 56.2μV ;
  - SW - 6,100kHz; RF level < 17.8μV.

On the following page the figures give an overview of all required connections to execute the tests.

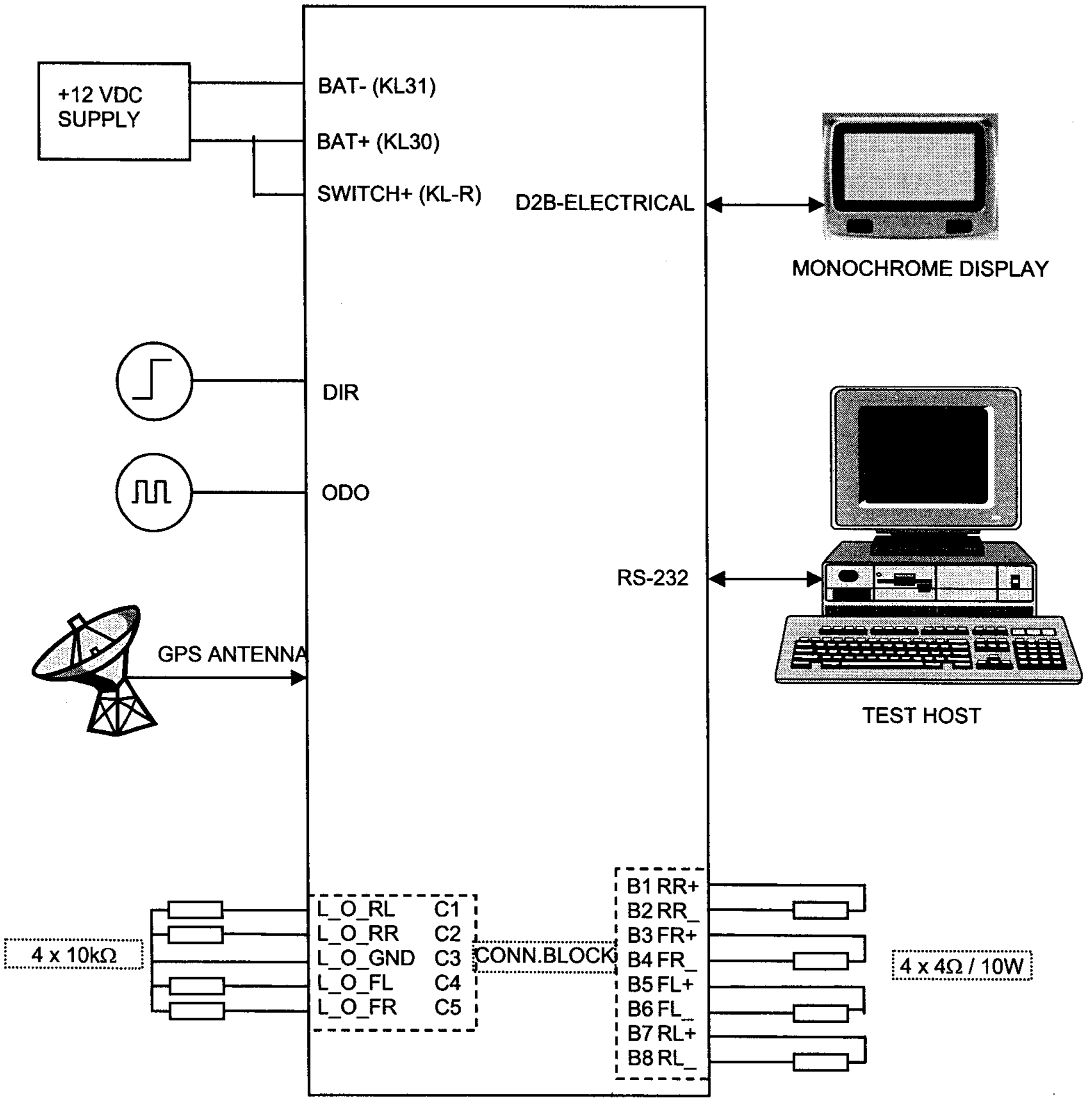

+12 VDC
SUPPLY
BAT- (KL31)
BAT+ (KL30)
SWITCH+ (KL-R)
D2B-ELECTRICAL
MONOCHROME DISPLAY
DIR
ODO
RS-232
TEST HOST
GPS ANTENNA
4 x 10kΩ
L_O_RL C1
L_O_RR C2
L_O_GND C3
L_O_FL C4
L_O_FR C5
CONN.BLOCK
B1 RR+
B2 RR_
B3 FR+
B4 FR_
B5 FL+
B6 FL_
B7 RL+
B8 RL_
4 x 4Ω / 10W

Figure i - Test connections

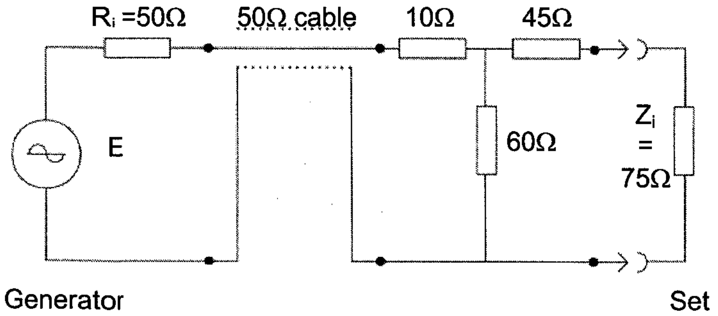

Rᵢ =50Ω
50Ω cable
10Ω
45Ω
E
60Ω
Zᵢ
=
75Ω
Generator
Set

Figure ii - FM aerial matching circuit

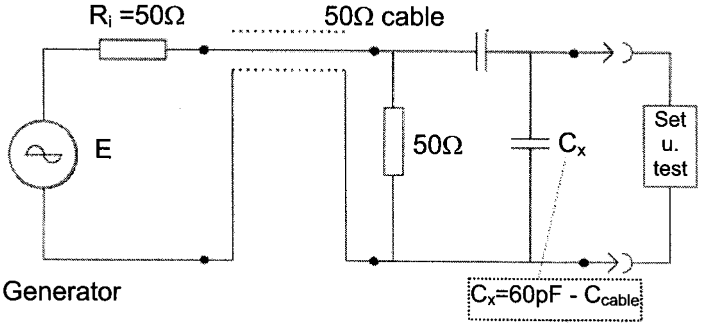

Rᵢ =50Ω
50Ω cable
E
50Ω
Cₓ
Set
u.
test
Generator
Cₓ=60pF - C_cable

Figure iii - AM aerial matching circuit

DISASSEMBLY / RE-ASSEMBLY PROCEDURES

1. Important:

Use ESD protection equipment!
For re-assembling, follow the procedures in the reverse order and read thoroughly all added *notes*.
Take care that wires, cams etc. are in the right position again after re-assembling.
For the exact position of the parts, refer to the exploded views or PCB layouts.

2. Top Cover (pos.11)

- Remove the screw pos.9.
- Take off the top cover.

3. CDM-M3/4.7 Module (pos.1003)

- Remove the top cover pos.11.
- Remove 3 screws pos.13.
- Remove 1 screw at the right side.
- Check if no disc is in yet.
  If so, be careful when lifting the module. Otherwise, the disc can be damaged or broken.
- Lift the module out of the set.
- Loosen the 18-pole flat cable from the main PCB connector pos.1501.
- Take the module out.

4a. Front assy pos.1001 - *only MS4150RS / NAV-R45 sets*

- Remove the top cover (see '**2.**').
- Remove the CDM-M3/4.7 module pos.1003 (see '**3.**').
- Remove the three screws pos.4.
- Carefully press the lip at the right side to the right resp. the lip at the left side to the left so that it becomes free from the chassis and pull the front assy slightly forward.
- Remove the plastic cable protector from the main PCB.
- Remove the flexfoil from the main PCB connector pos.1101.
- Remove the 2-pole 'flap-down' switch cable from the main PCB connector pos.1103.

Note: The front assy is a complete spare part. Although this manual contains - for reference purposes - an exploded view of the front assy itself, there are NO separate front unit spare parts! Therefore, do not try to repair the front unit but replace it by a new one if any defect may occur e.g. faulty display or buttons, broken plastic parts etc..

When re-assembling, take care of the following:

- The flat cable should be inserted straight into the main PCB front connector.
- Re-insert the plastic cable protector on the main PCB.
- Connect the small 'flap-down' switch cable to its main PCB connector.
- The two plastic lips must fall just into their corresponding notches in the chassis front.
- The front assy must be pushed carefully and straight backwards until a click is heard.

4b. Front Ornamental Plate Assy pos.1001 / Front Detachable Unit pos.1002 - *only MS4200RS sets*

- First, unlock the front detach unit and take it off the set.

Note: The front assy is a complete spare part. Although this manual contains - for reference purposes - an exploded view of the front assy itself, there are NO separate front unit spare parts! Therefore, do not try to repair the front unit but replace it by a new one if any defect may occur e.g. faulty display or buttons, broken plastic parts etc..

- Remove the top cover (see '**2.**').
- Remove the CDM-M3/4.7 module pos.1003 (see '**3.**').
- Remove the four screws pos.4.
- Carefully press the lip at the right side to the right resp. the lip at the left side to the left so that it becomes free from the chassis and pull the front ornamental plate assy slightly forward.
- Remove the flexfoil from the main PCB connector pos.1101.
- Remove the 2-pole 'flap-down' switch cable from the main PCB connector pos.1103.

When re-assembling, take care of the following:

- The flat cable should be inserted straight into the main PCB front connector.
- Connect the small 'flap-down' switch cable to its main PCB connector.
- The two plastic lips must fall just into their corresponding notches in the chassis front.
- The front ornamental plate assy must be pushed carefully and straight backwards until a click is heard.

5. GPS receiver assy pos.1000-1105

- Remove the top cover (see '**2.**').
- Remove the CDM-M3/4.7 module pos.1003 (see '**2.**').
- Remove the front assy pos.1001 (see '**4a.**' - *for MS4150RS / NAV-R45 sets*).
- Remove the front detach unit and - ornamental plate assy pos.1002 and -1001 (see '**4b.**' - *for MS4200RS sets*).
- Although not strictly necessary, it is recommended to remove first the main PCB pos.1000 (see '**6.**'), to prevent damage of its parts.
- Pull off, if necessary, the GPS receiver antenna cable pos.1000-0004.
- Remove the flat cable from the main PCB connector.
- Remove the four GPS receiver fixation screws.

- Slide the receiver forward so that it becomes free from the fixation brackets.
- Take the receiver out.
- If the antenna cable pos.1000-0004 has to be removed, then remove the hex fixation nut and ring from the antenna connector at the rear of the chassis.
- After re-inserting the (new) cable, take care that it lies behind the rest of the chassis.

Notes:
- When re-assembling, take care that the metal box of the GPS receiver is closed properly and that the antenna connector of the GPS receiver is at the left of the rear receiver fixation bracket on the main PCB.
- When re-inserting the flat cable, take care that the red marked side is at the top position of the receiver connector and at the left position of the main PCB connector!

6. Main PCB assy pos.1000

- Remove the CDM-M3/4.7 module pos.1003 (see '**2.**').
- Remove the front assy pos.1001 (see '**4a.**' - *for MS4150RS / NAV-R45 sets*).
- Remove the front detach unit and - ornamental plate assy pos.1002 and -1001 (see '**4b.**' - *for MS4200RS sets*).
- Disconnect the following cables from the main PCB:
  - GPS receiver antenna cable pos.1000-0004.
  - Fan assy cable.
- Unscrew the screws pos.5, pos.6 and pos.14.
- Remove the bottom cover pos.10.
- Unscrew three main PCB fixation screws pos.2.
- Take out the main PCB.

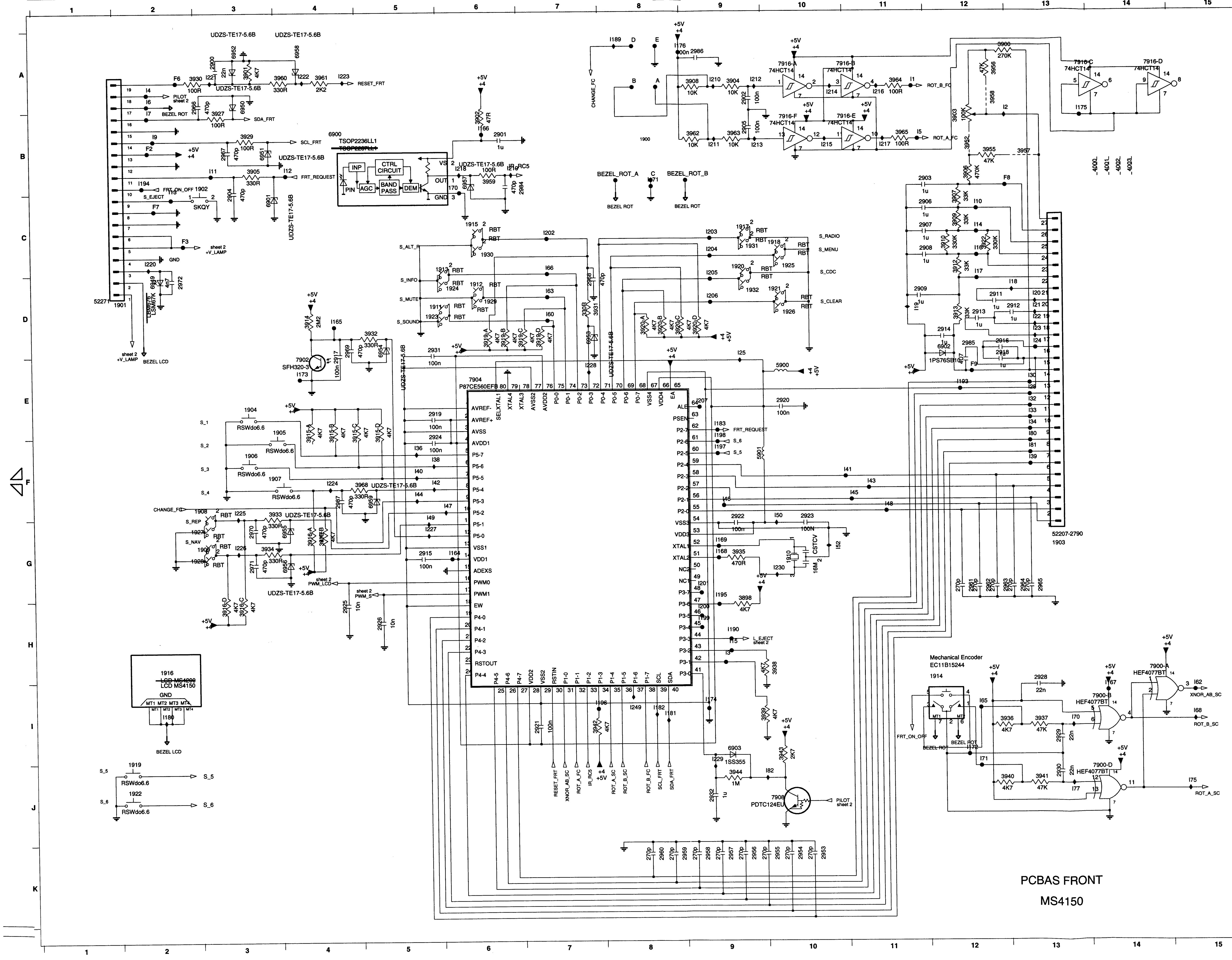
Notes:
- When re-assembling the main PCB, take care of the following:
  - The EMC protection covers pos.1000-0002 and -0003 must be fitted tight and properly at their places (no bent lips).
  - The main PCB must rest close to the three fixation points and the two lips at the front of the chassis must fall just into the corresponding notches of the PCB (no play of PCB).
  - The connector fixation screws must be tightened properly.
  - Don't forget to connect the fan - and GPS receiver antenna cable!

7. Fan assy pos.1-0040

- Remove the CDM-M3/4.7 module pos.1003 (see '**2.**').
- Remove the front assy pos.1001 (see '**4a.**' - *for MS4150RS / NAV-R45 sets*).
- Remove the front detach unit and - ornamental plate assy pos.1002 and -1001 (see '**4b.**' - *for MS4200RS sets*).
- Remove the main PCB pos.1000 (see '**6.**').
- Cut the four fan strings pos.1-0041...-0044 just between the rounded part and the chassis (at the rear).
- Take out the fan.

Notes:
- When re-assembling the fan, follow this procedure:
  - Insert the conical end of the strings at the label side of the fan.
  - Pull each string until (after two slight clicks) the big rounded end just rests in the hole of the fan.
  - Hold the fan with the cable in top right position.
  - Put four new strings through the four holes at the chassis rear simultaneously.
  - Pull each of the strings through the holes until one of the smaller rounded parts just goes through the holes (after one slight click).
  - Look if the fan is mounted properly and reconnect the fan cable to the main PCB connector.
  - Cut off the four conical parts of the strings just behind the rounded parts.

MS4150RS Front - Circuit 1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SDA_FRT
SCL_FRT
FRT_REQUEST
FRT_ON_OFF
S_EJECT
SKQY
sheet 2 +V_LAMP
GND
52271
1901
BEZEL LCD
6900
TSOP2236LL1
INP
CTRL CIRCUIT
PIN
AGC
BAND PASS
DEM
VS
OUT
GND
IR_RC5
CHANGE_FC
BEZEL_ROT_A
BEZEL_ROT_B
BEZEL ROT
7916-A 74HCT14
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7916-C 74HCT14
7916-D 74HCT14
7916-E 74HCT14
7916-F 74HCT14
ROT_B_FC
ROT_A_FC
RBT
S_ALT
S_INFO
S_MUTE
S_SOUND
S_RADIO
S_MENU
S_CDC
S_CLEAR
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SFH320-3
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P87CE560EFB
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AVREF+
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VSS1
VDD1
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PWM1
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RSTOUT
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XTAL4
XTAL3
AVSS2
AVDD2
VSS4
VDD4
EA
ALE
PSEN
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XTAL2
NC2
NC1
VDD2
VSS2
RSTIN
SCL
SDA
CSTCV
16M
S_1
S_2
S_3
S_4
RSWdo6.6
S_REP
S_NAV
sheet 2 PWM_LCD
sheet 2 PWM_S
L_EJECT sheet 2
1916
LCD MS4200
LCD MS4150
GND
MT1 MT2 MT3 MT4
BEZEL LCD
S_5
S_6
1919
1922
1SS355
PDTC124EU
7908
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ROT_A_SC
ROT_B_SC
Mechanical Encoder
EC11B15244
1914
FRT_ON_OFF
7900-A HEF4077BT
7900-B HEF4077BT
7900-D HEF4077BT
XNOR_AB_SC
ROT_B_SC
ROT_A_SC
1PS76SB10
52207-2790
1903
PCBAS FRONT
MS4150

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C	B8
D	A8
E	A8
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F3	C2
F6	A2
F7	C2
F8	B12
F9	E12
I1	A11
I2	B12
I3	H9
I4	A2
I5	B11
I6	A2
I7	B2
I9	B2
I10	C12
I11	B3
I12	B4
I13	C2
I14	C12
I15	H9
I16	C12
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I18	D13
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I20	D13
I21	D13
I22	D13
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I25	E9
I28	E13
I30	E13
I32	E13
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I45	F11
I46	F9
I47	F6
I48	F11
I49	G5
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I52	G10
I60	D7
I62	I15
I63	D7
I65	I12
I66	C7
I68	I15
I70	I13
I71	J12
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I80	F13
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I82	J9
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1902	C3
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1905	F3
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1911	D6
1912	D6
1913	C6
1914	I12
1915	C6
1916	I2
1917	C9
1918	C10
1919	J2
1920	C9
1921	D10
1922	J2
1923	D6
1924	D6
1925	C10
1926	D10
1927	G3
1928	G3
1929	D6
1930	C6
1931	C9
1932	D9
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2901	B6
2902	A9
2903	B11
2904	B3
2905	B9
2906	C11
2907	C11
2908	C11
2909	D11
2911	D12
2912	D13
2913	D12
2914	D12
2915	G5
2916	D12
2917	D4
2918	E12
2919	E5
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2921	I7
2922	G9
2923	G10
2924	F5
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2930	J13
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2965	G13
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2967	B3
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2969	D4
2970	G3
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2972	D2
2984	B6
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3940	J12
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3952	B12
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3956	A12
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4002	B14
4003	B14
5900	E10
5901	F9
6900	B5
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6949	D2
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6951	B3
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6954	D5
6955	G4
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6959	F5
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7900-B	I14
7900-D	J14
7902	E4
7904	G7
7908	J10
7916-A	A10
7916-B	A11
7916-C	A14
7916-D	A14
7916-E	B11
7916-F	B10
BEZEL_ROT_A	B8
BEZEL_ROT_B	B9
I164	G6
I165	D4
I166	B6
I167	I14
I168	G9
I169	G9
I170	B6
I171	B8
I172	I12
I173	E4
I174	I9
I175	B13
I176	A8
I180	I2
I181	I8
I182	I8
I183	E9
I189	A8
I190	H9
I193	E12
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I197	F9
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I199	H9
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I204	C9
I205	D9
I206	D9
I207	E9
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I211	B9
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I213	B9
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I215	B10
I216	A11
I217	B11
I218	B6
I219	B6
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I221	A3
I222	A4
I223	A4
I224	F4
I225	F3
I226	G3
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I228	E7
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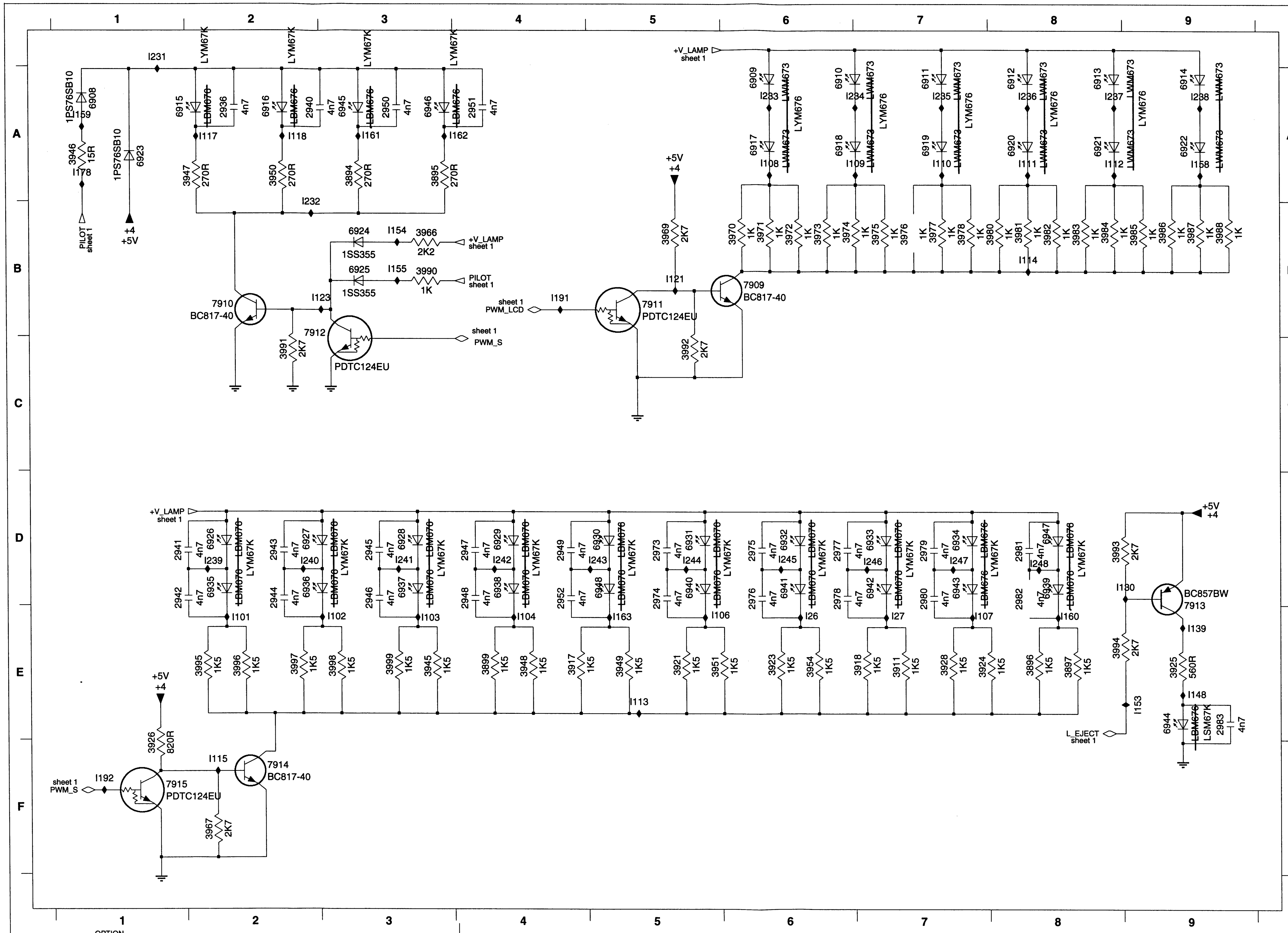
I230	G10
I249	I8

MS4150 Front - Circuit 2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D
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+V_LAMP sheet 1
+5V +4
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sheet 1 PWM_LCD
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3928 1K5
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I139
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I243 D5
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I245 D6
I246 D7
I247 D7
I248 D8

OPTION FOR MK4.5 OEM Version	LED TYPE
6915, 6916, 6945, 6946, 6926, 6927, 6928, 6929, 6930, 6931, 6932, 6933, 6934, 6948 6947, 6943, 6942, 6941, 6940, 6939, 6938, 6937, 6936, 6935	LOM67K
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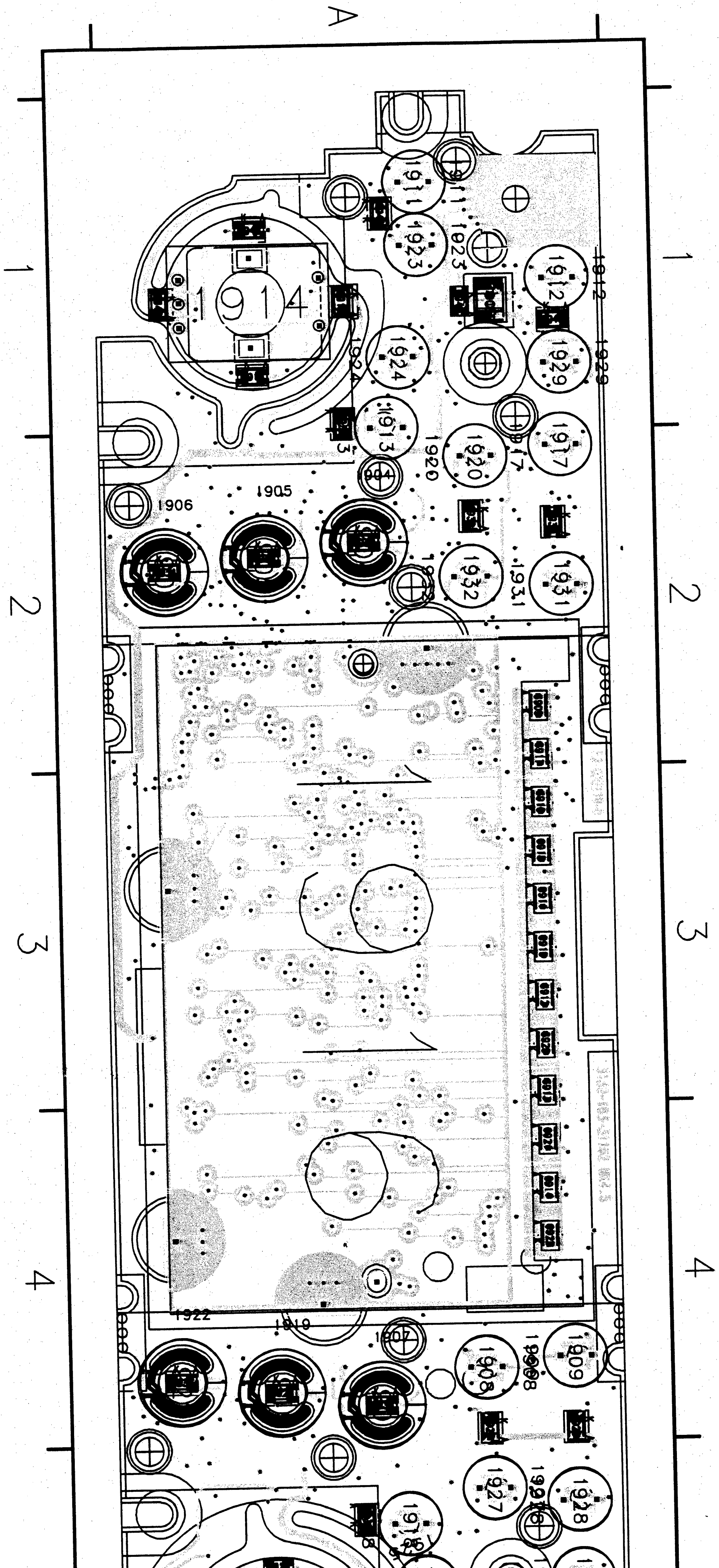
PCBAS FRONT
MS4150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1
2
3
4
1914
1911
1923
1912
1929
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1905
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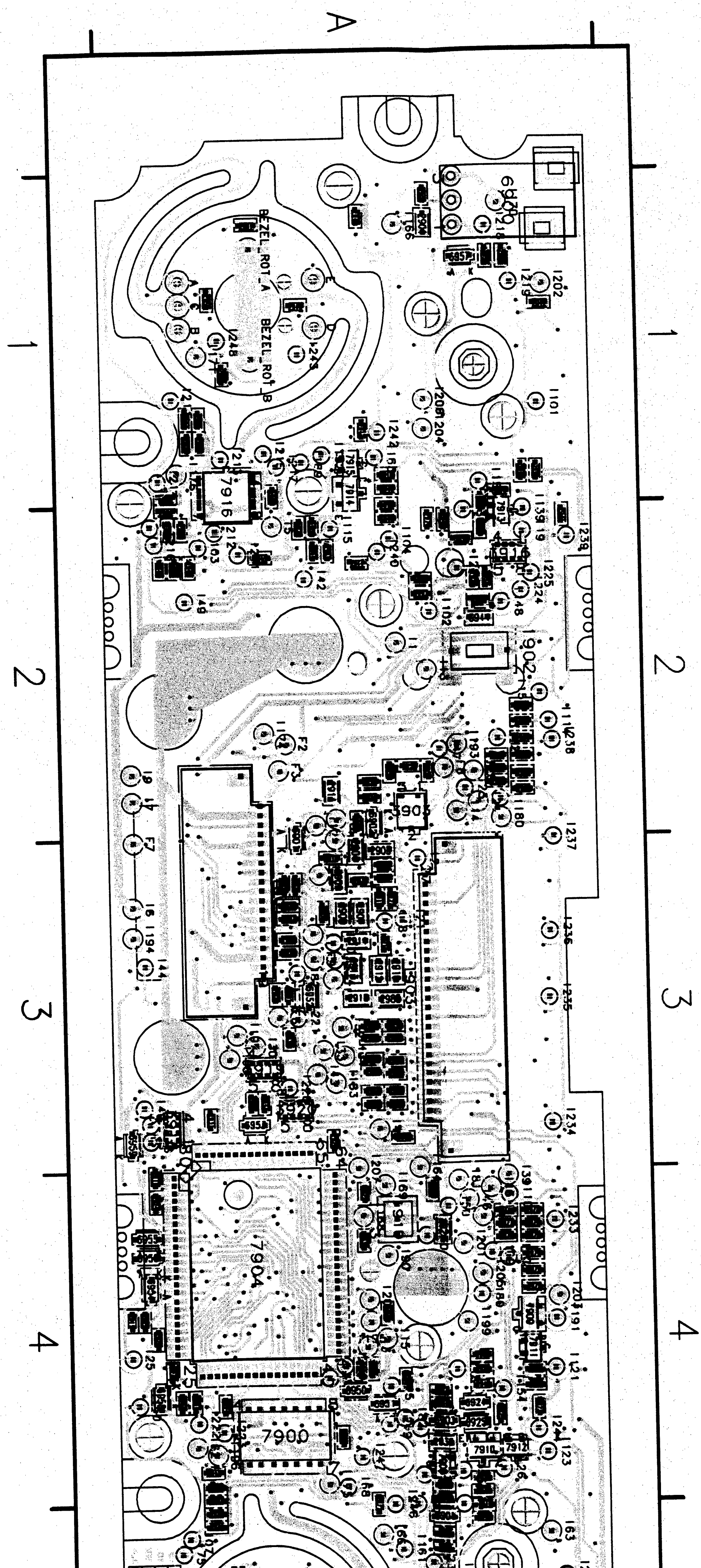
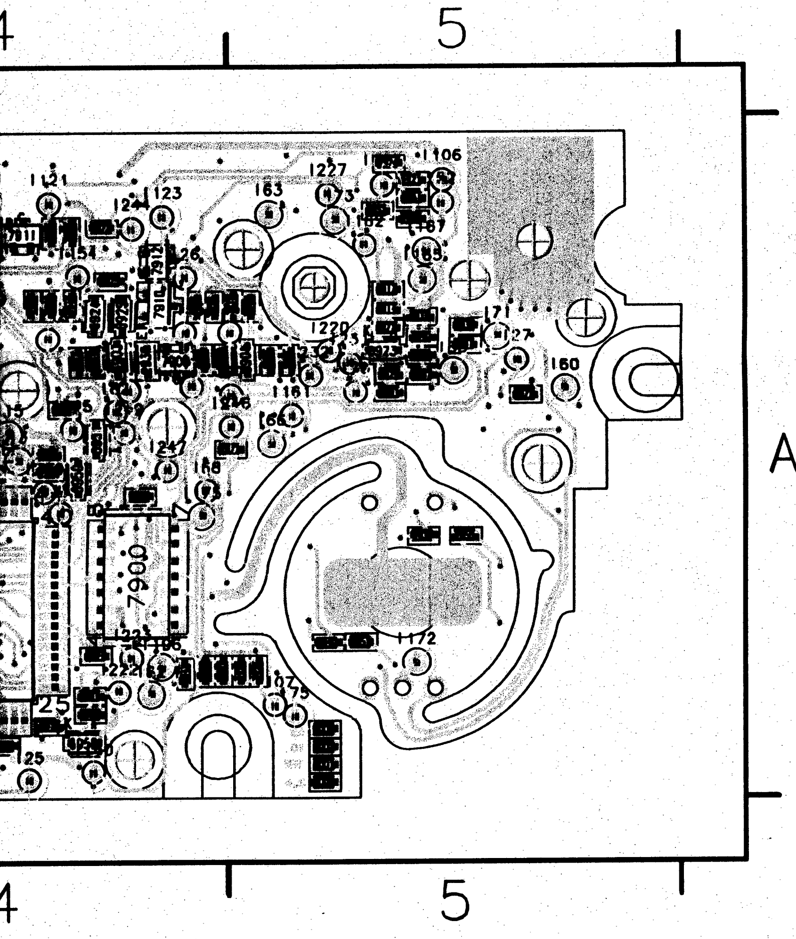
1909
1927
1928
1918


A
BEZEL_ROT_A
BEZEL_ROT_B
1902



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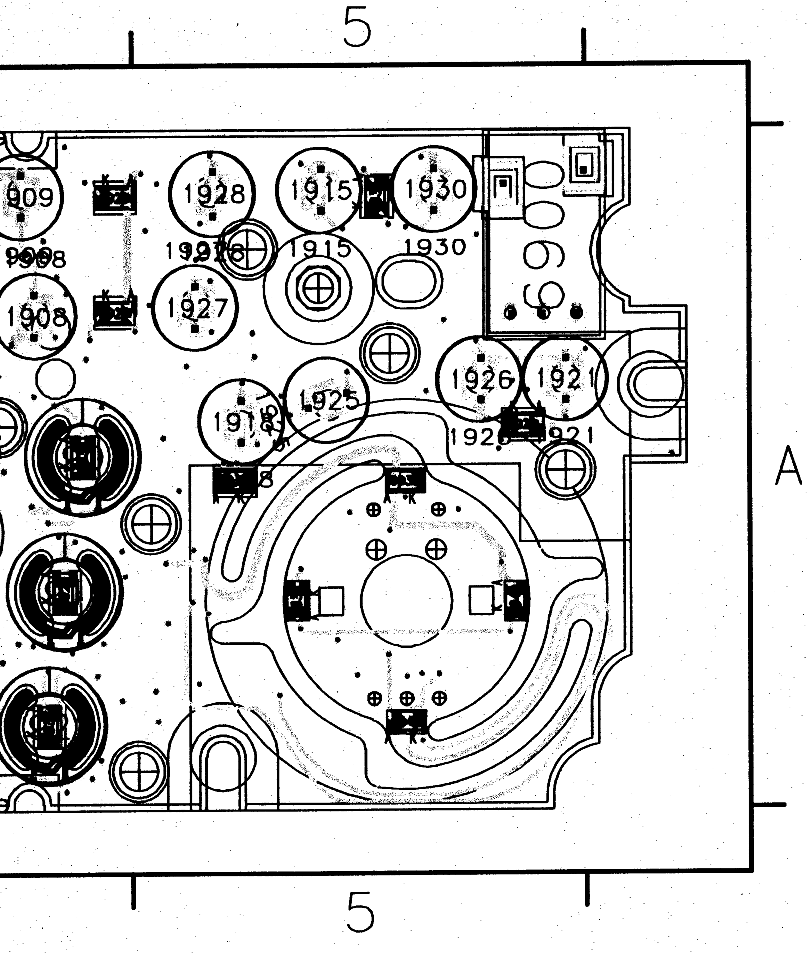

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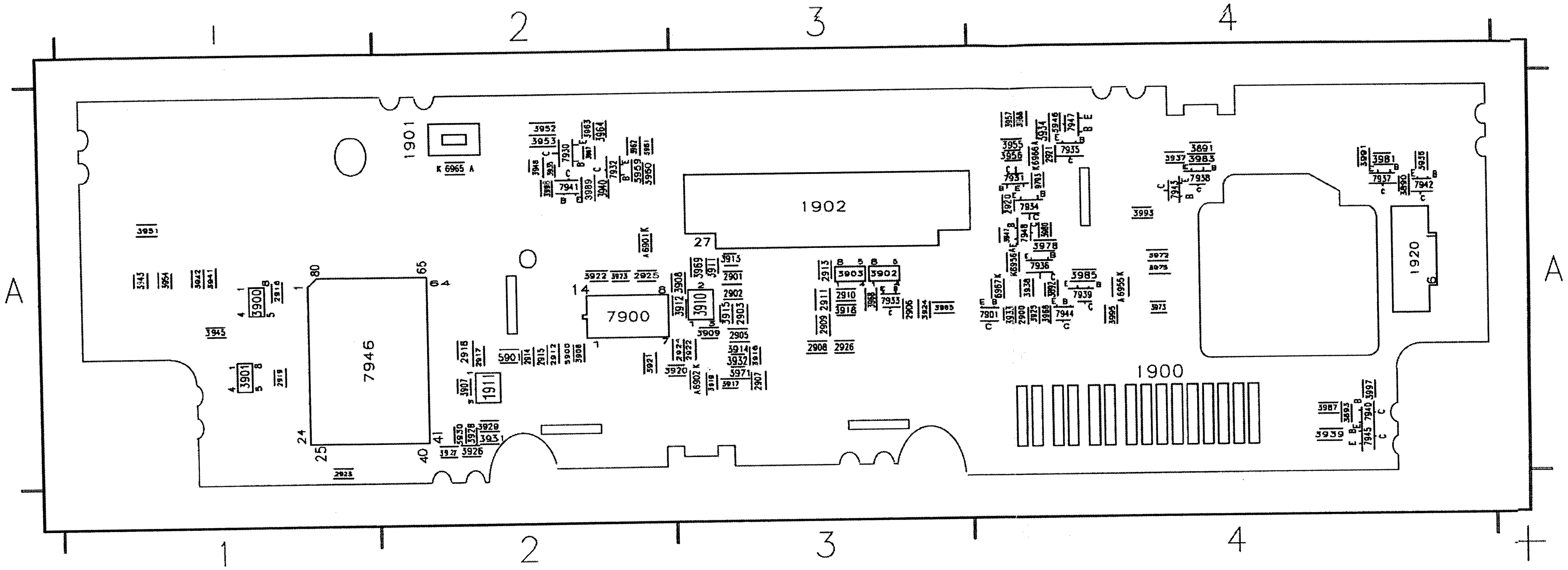
MS4200RS Front PCB Layout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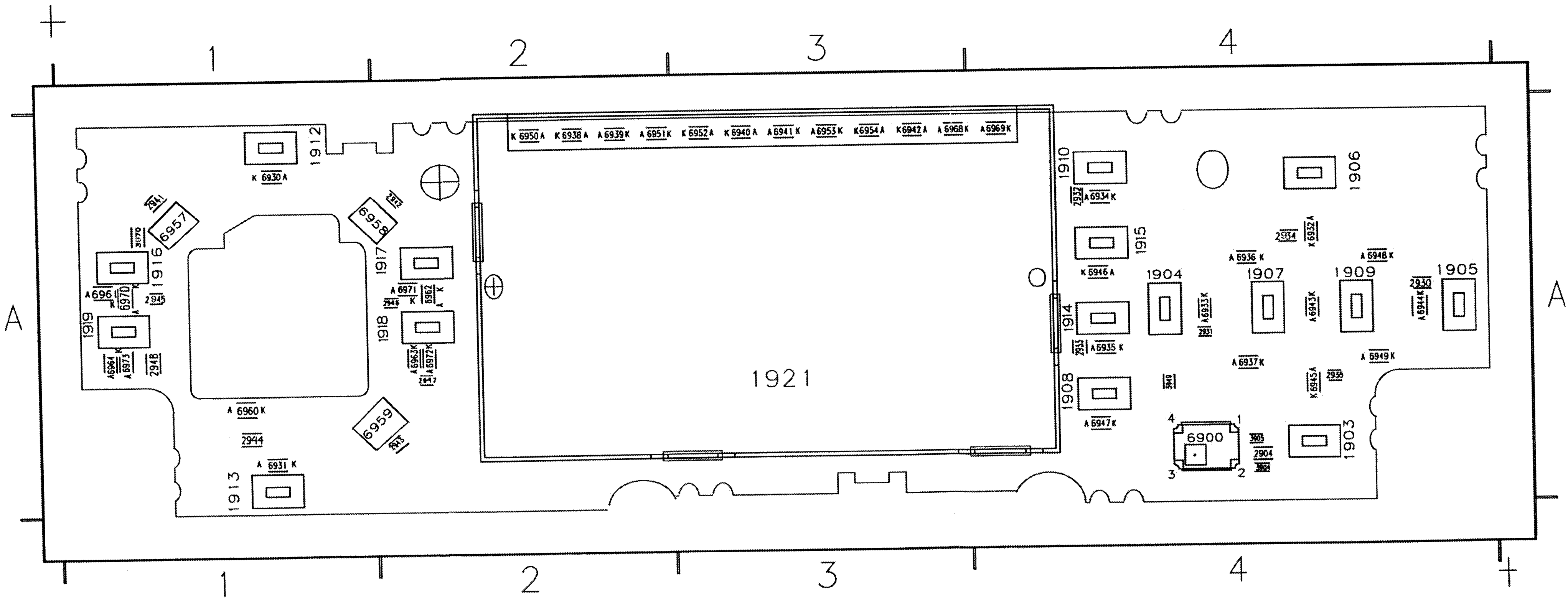
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A

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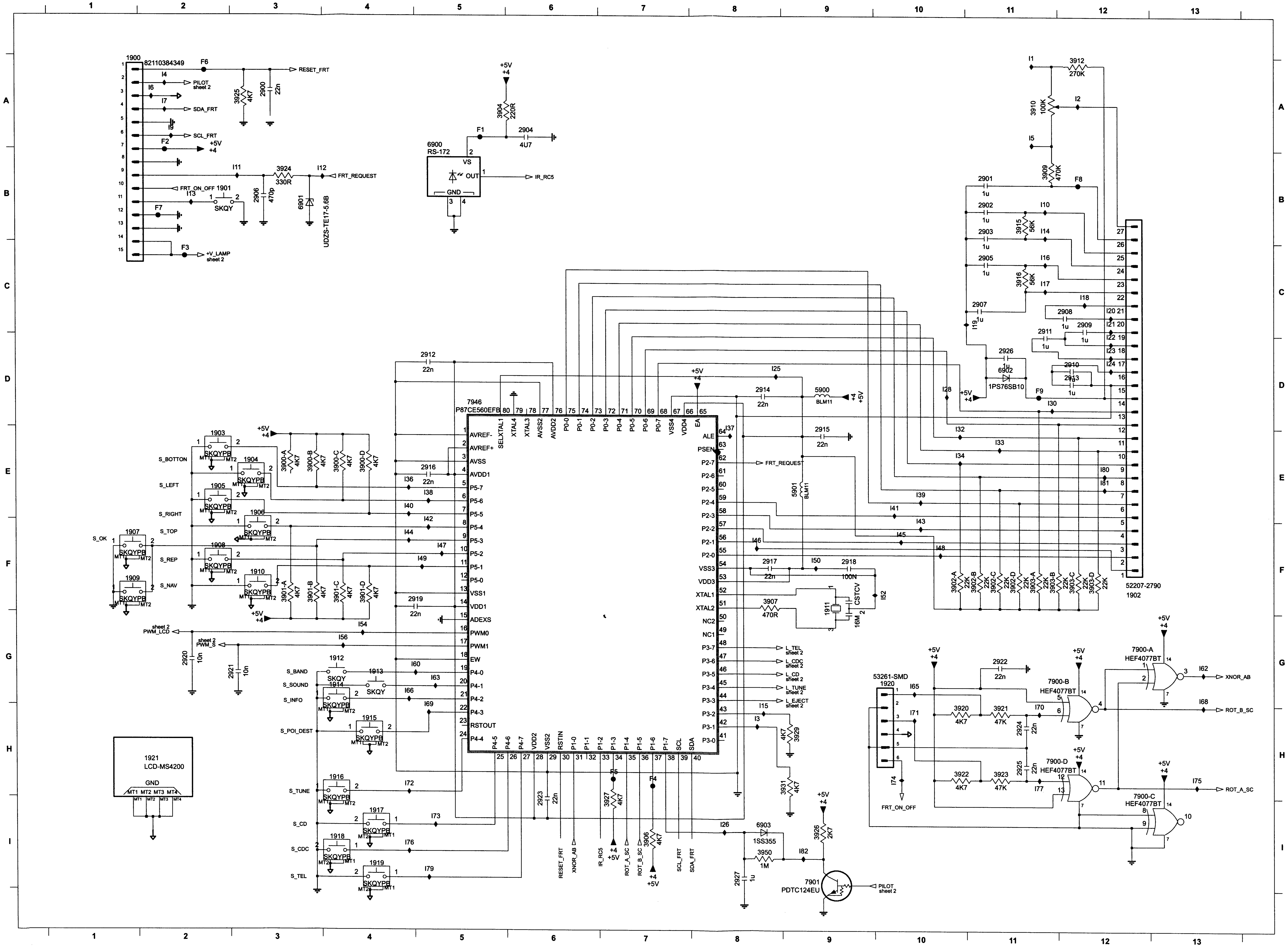
MS4200RS Front - Circuit 1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SCL_FRT
+5V +4
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2906 470p
6901 UDZS-TE17-5.6B
3925 4K7
2900 22n
+V_LAMP sheet 2
+5V +4
3904 220R
2904 4U7
6900 RS-172
VS
OUT
GND
IR_RC5
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AVREF-
AVREF+
AVSS
AVDD1
P5-7
P5-6
P5-5
P5-4
P5-3
P5-2
P5-1
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VDD1
ADEXS
PWM0
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EW
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P4-2
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XTAL4
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AVDD2
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VDD4
EA
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SCL
SDA
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2915 22n
5901 BLM11
2916 22n
2917 22n
2918 100N
3907 470R
1911 16M CSTCV
2919 22n
S_BOTTON
S_LEFT
S_RIGHT
S_TOP
S_OK
S_REP
S_NAV
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PWM_S sheet 2
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S_SOUND
S_INFO
S_POI_DEST
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1914 SKQYPB
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S_TUNE
S_CD
S_CDC
S_TEL
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MT1 MT2 MT3 MT4
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SDA_FRT
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L_CDC sheet 2
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L_TUNE sheet 2
L_EJECT sheet 2
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ROT_A_SC

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I13	B2
I14	B11
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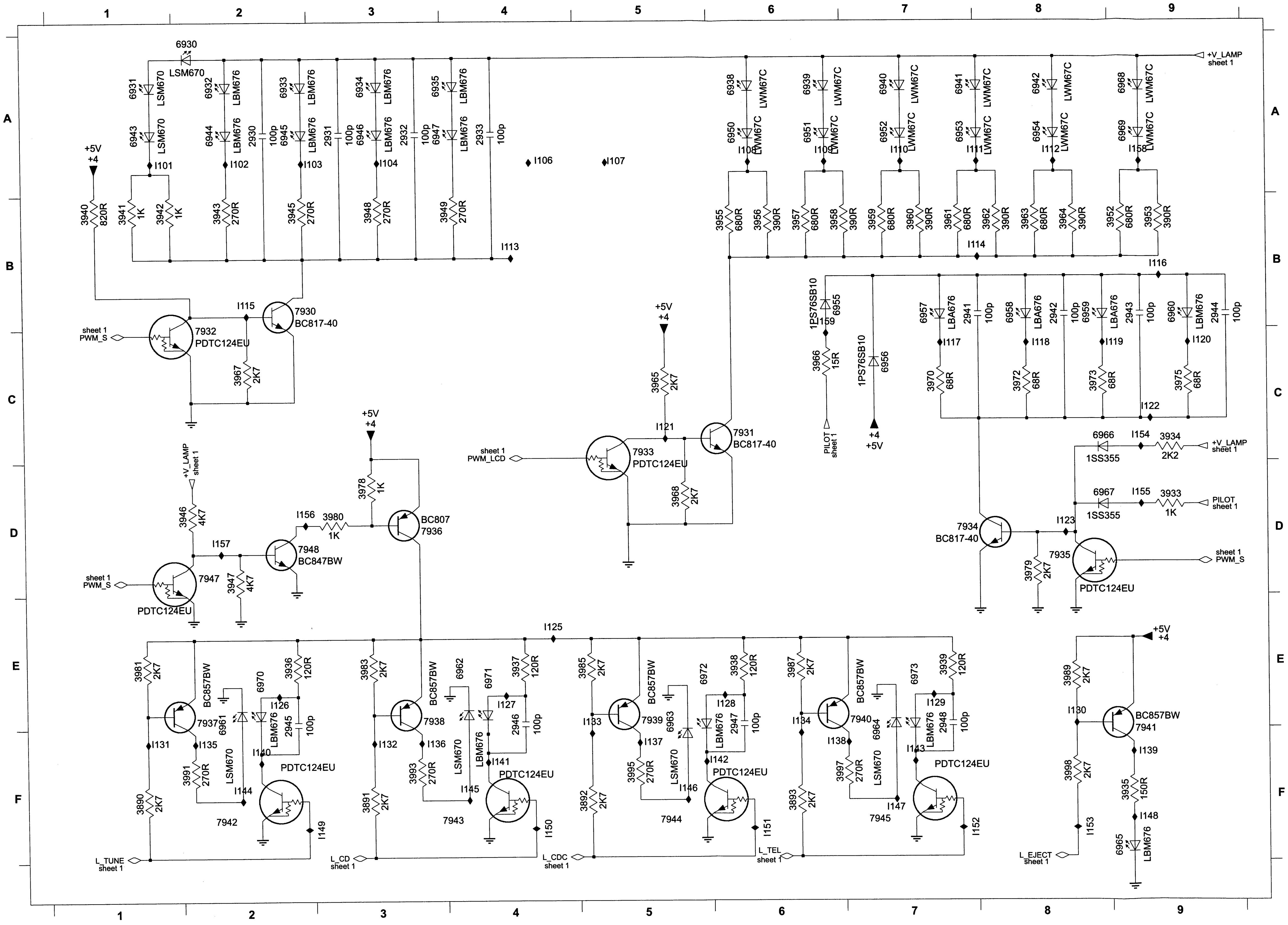
PCB ASSY FRONT MICRO CONTROLLER PART
MS 4200

MS4200RS Front - Circuit 2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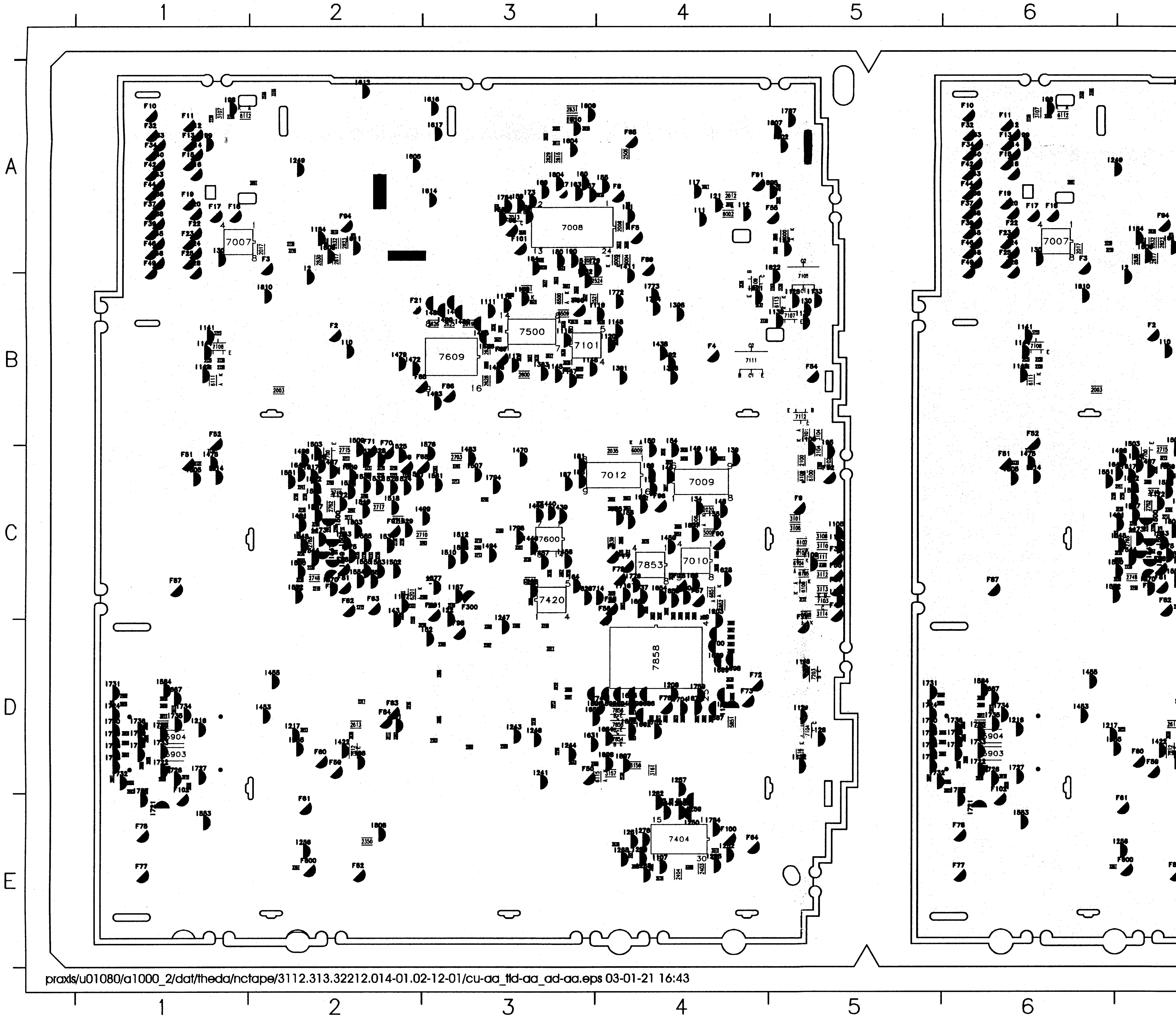
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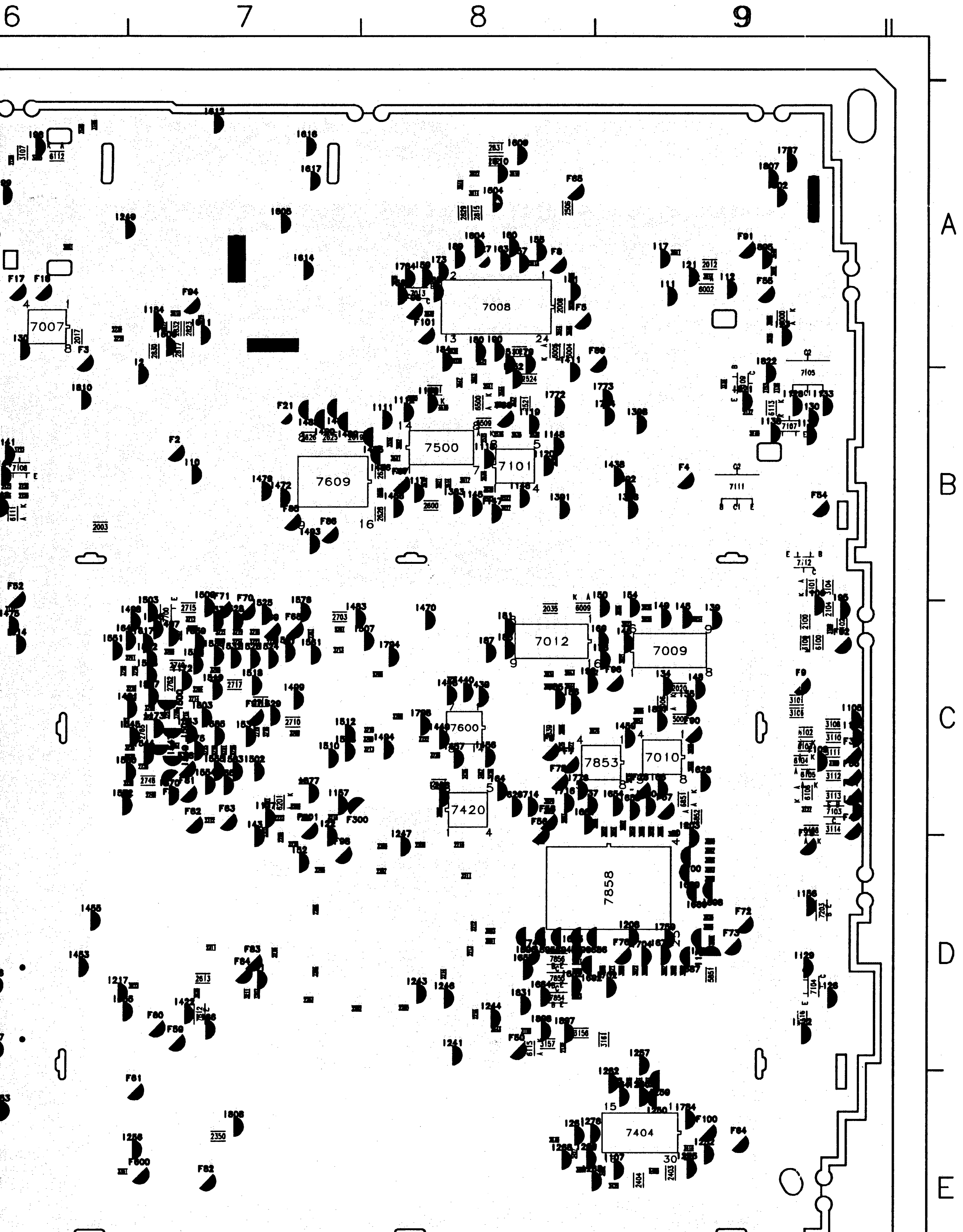

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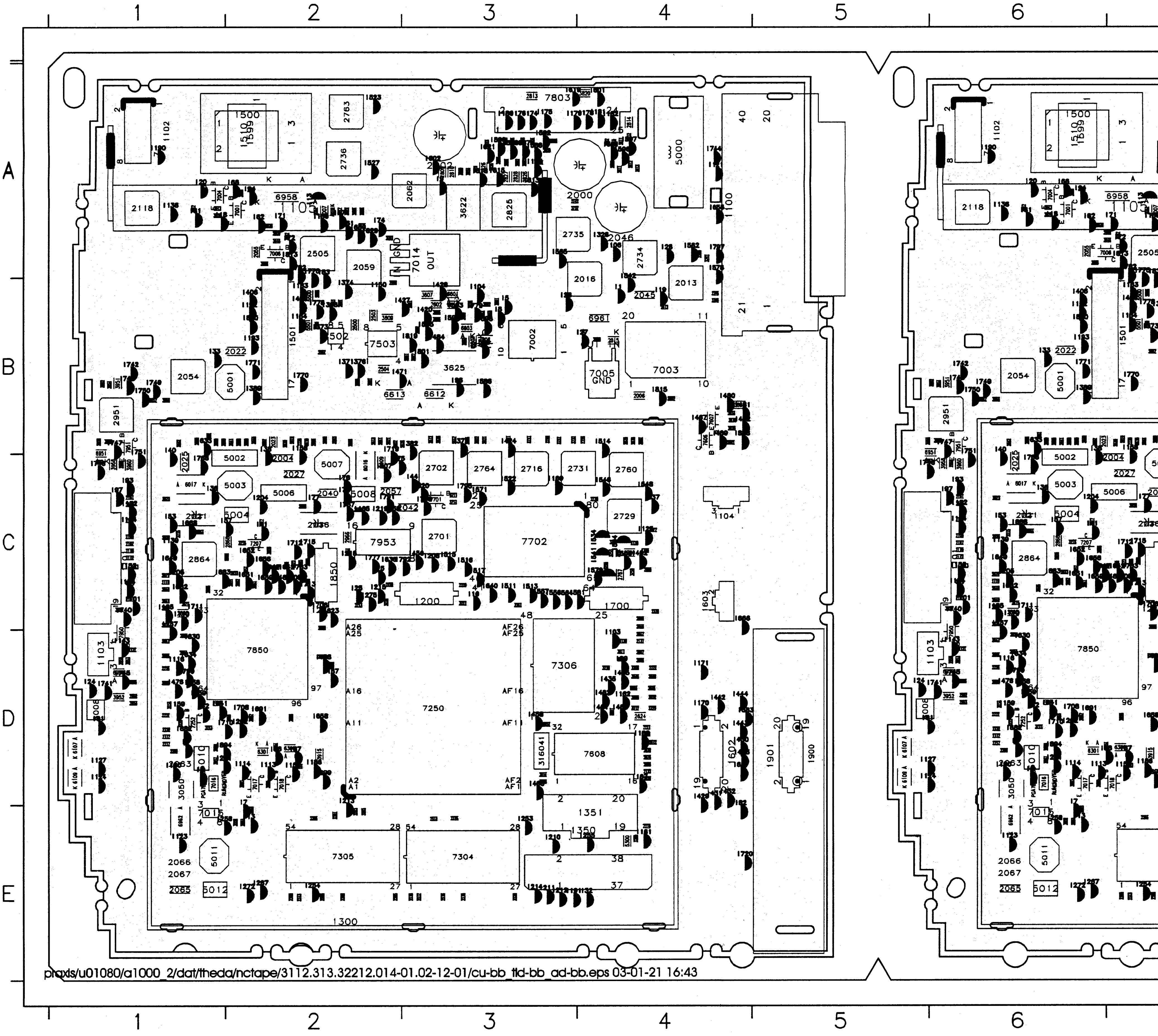

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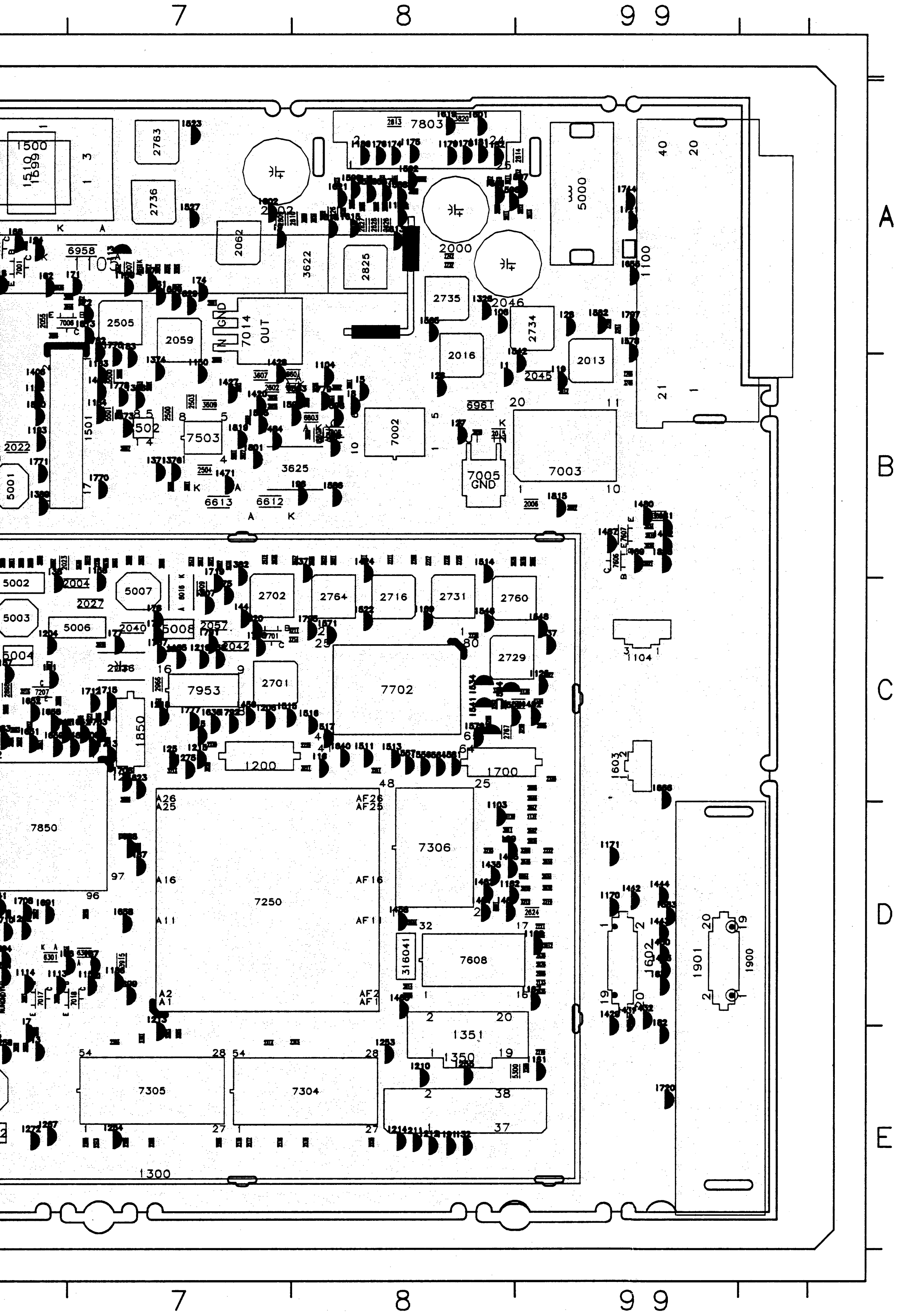

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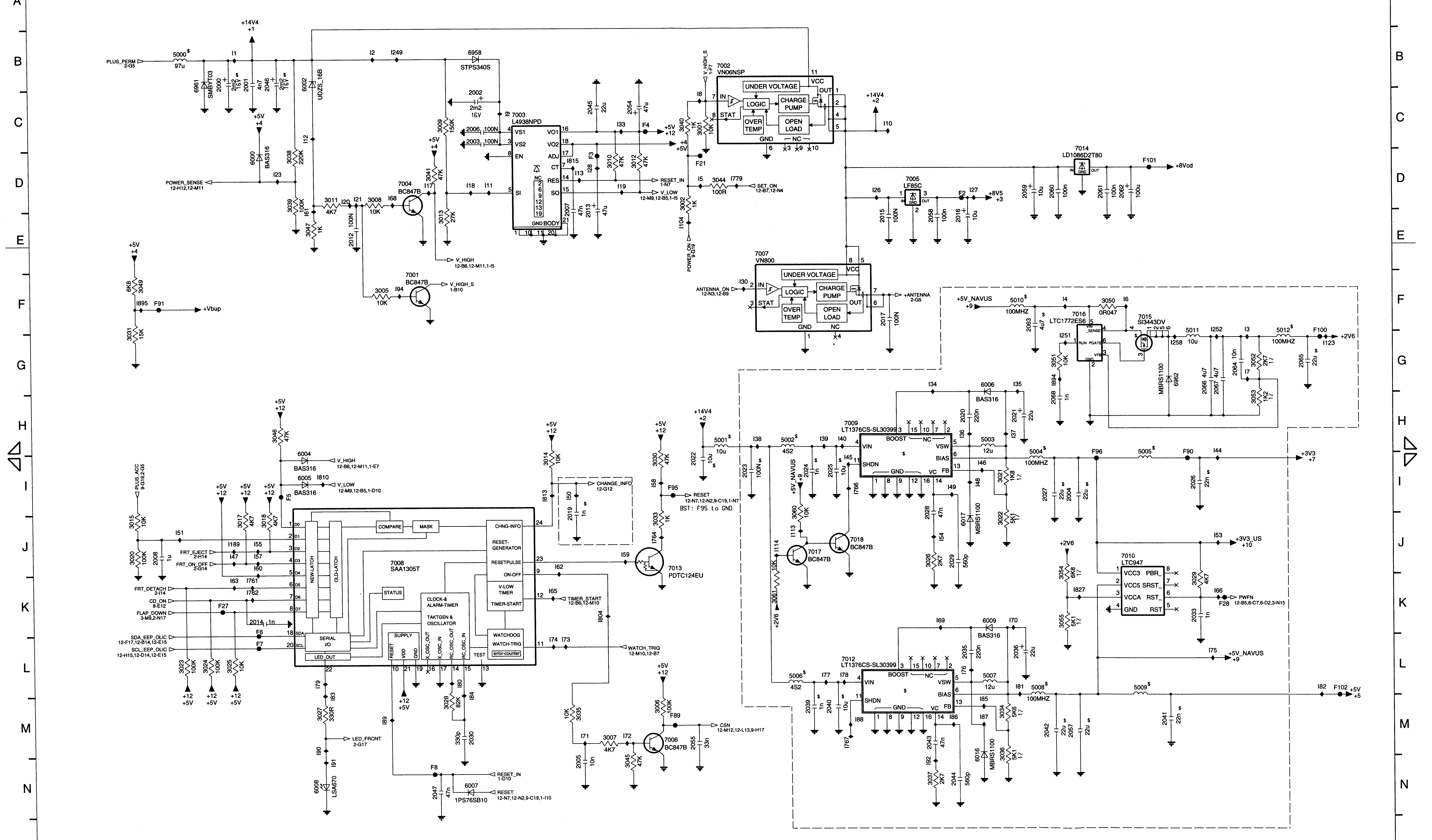
2217	D6
2218	E9
2219	D9
2221	D9
2222	D9
2227	D6
2228	B7
2229	C8
2230	C7
2232	D6
2234	D6
2300	E7
2301	E7
2304	E7
2305	E7
2308	E7
2309	E7
2313	E7
2314	E7
2315	E8
2316	E7
2317	E7
2318	E7
2319	E8
2320	E8
2330	C9
2500	B7
2501	B7
2503	B7
2504	B7
2505	A7
2507	B7
2508	B7
2509	B7
2512	B7
2513	B7
2515	B8
2601	B8
2602	B7
2604	D9
2605	D9
2606	D9
2607	D9
2608	B7
2609	B7
2610	B7
2614	D8
2615	B9
2616	B9
2617	B8
2618	B7
2621	B8
2622	B8
2624	D9
2630	B7
2632	D9
2633	D9
2634	D9
2635	D9
2636	D9
2700	C9
2701	C7
2702	C7
2708	B8
2716	C8
2721	B8
2723	B8
2727	B8
2729	C8
2730	C8
2731	C8
2732	B8
2734	A9
2735	A8
2736	A7
2742	A8
2745	B9
2759	A9
2760	C8
2763	A7
2764	C8
2767	C8
2801	B7
2802	A8
2803	A8
2804	A8
2805	A8
2806	A8
2807	B7
2808	A8
2809	A7
2810	A8
2811	A8
2812	A9
2813	A8
2814	A9
2824	A8
2825	A8
2826	A8
2827	A8
2828	A8
2833	C6
2840	B6
2841	B6
2842	B6
2843	D6
2844	C6
2845	C6
2846	C9
2847	D9
2848	C6
2849	C6
2850	C7
2851	C6
2852	C6
2853	D6
2854	D6
2856	D6
2857	D6
2858	D7
2859	D7
2860	C7
2862	B6
2864	C6
2865	C6
2866	C6
2868	C7
2869	C7
2871	B7
2873	C6
2874	C6
2875	C6
2876	D9
2877	C9
2878	B7
2879	B8
2887	C6
2888	B6
2889	B6
2890	B6
2891	B9
2894	D6
2895	D6
2896	C9
2897	B6
2898	B6
2899	B6
2950	D6
2951	B6
2952	D6
2953	D6
2956	B5
2957	C5
2958	C6
2963	B7
2964	B7
2965	C9
2966	C7
3001	B8
3002	B8
3005	A6
3006	A6
3007	A7
3008	A6
3009	A6
3010	A7
3012	B9
3013	A6
3017	A7
3023	A7
3024	A7
3025	A7
3035	A6
3040	B8
3044	B8
3045	A7
3047	A6
3050	D6
3051	D6
3052	E6
3053	E6
3060	D6
3061	D6
3138	C9
3139	D8
3203	E7
3205	E7
3206	D9
3208	D6
3209	E9
3210	D8
3212	D9
3213	C7
3214	D6
3215	C6
3217	C6
3218	C6
3220	C7
3221	C8
3223	D6
3225	D6
3251	C8
3254	D6
3500	B7
3501	B7
3503	B7
3554	C7
3555	C7
3600	B7
3603	B8
3605	B7
3607	B7
3609	B7
3610	D8
3611	D8
3612	D9
3621	B9
3622	A8
3624	B9
3625	B8
3628	B9
3629	B9
3631	D8
3636	D8
3645	D9
3650	D9
3711	C8
3714	C8
3737	A8
3740	B9
3741	A9
3753	C8
3756	C8
3757	C8
3758	C8
3759	C9
3800	B8
3801	B7
3802	B7
3803	A8
3804	A8
3805	A8
3806	A8
3807	A8
3808	A8
3809	A8
3810	A8
3811	A8
3812	A9
3813	A9
3820	A8
3823	A8
3824	A8
3825	A8
3826	A8
3827	B7
3828	B8
3829	A8
3857	C6
3858	C6
3864	C6
3865	C7
3872	C7
3874	C6
3884	C6
3900	D7
3913	D7
3915	D7
3950	C6
3951	B6
3952	D6
3953	D6
3954	B6
3955	D6
3956	B6
3957	B6
3958	C6
3959	B6
3960	C6
3962	B6
4101	C6
5000	A9
5001	B6
5002	C6
5003	C6
5004	C6
5006	C7
5007	C7
5008	C7
5009	C7
5010	D6
5011	E6
5012	E6
5300	E9
5500	B7
5501	B7
5601	D8
5604	D9
5850	C6
6007	A7
6008	D5
6016	C7
6017	C6
6107	D5
6109	D5
6300	D7
6301	D6
6601	B8
6612	B7
6613	B7
6614	B8
6803	B8
6804	B8
6950	D6
6951	B6
6958	A7
6961	B8
6962	E6
7001	A6
7002	B8
7003	B9
7004	A6
7005	B8
7006	A6
7014	A7
7015	E6
7016	D6
7017	D6
7018	D7
7207	C6
7250	D7
7252	D6
7304	E8
7305	E7
7306	D8
7502	B7
7503	B7
7606	B9
7607	B9
7608	D8
7701	C7
7702	C8
7802	B8
7803	A8
7850	D6
7950	D6
7951	B6
7953	C7
11	B8
13	E6
14	D6
15	B8
16	D6
17	E6
18	B8
19	A7
113	A7
115	C7
116	C8
118	A6
119	B9
120	A6
124	D5
125	C7
126	B8
127	B8
128	A9
129	D8
132	E8
133	B6
136	C6
137	C6
138	C6
140	C6
141	C6
142	D6
144	C7
147	A7
153	C6
156	D6
161	A6
162	A6
167	D7
168	A6
170	C7
171	A7
172	A7
174	A7
175	C7
176	C7
177	C7
182	E9
183	B7
191	D5
193	C6
194	A6
196	B8
197	C6
1101	C6
1103	D8
1104	B8
1106	A8
1110	C6
1113	D6
1114	D6
1116	D6
1121	A9
1123	E6
1124	D5
1125	C9
1127	D5
1132	C6
1134	C6
1136	A6
1139	C6
1143	D6
1150	B7
1153	C6
1154	C6
1155	D7
1158	C7
1159	D6
1160	D6
1161	E9
1162	D8
1163	B7
1164	B7
1165	C7
1167	D9
1168	D9
1169	C8
1170	D9
1171	D9
1174	A8
1175	A8
1176	A8
1178	A8
1179	A8
1180	A8
1181	A8
1182	A8
1183	A8
1185	C6
1186	D7
1187	D7
1188	D7
1189	A7
1190	A6
1191	E8
1192	B6
1193	B6
1202	D6
1204	C6
1205	C6
1206	C7
1207	C7
1210	E8
1211	E8
1212	E8
1213	E7
1214	E8
1215	C7
1218	C7
1219	C7
1251	D6
1253	E8
1254	E7
1255	E8
1258	E6
1267	E6
1272	E6
1275	C7
1326	A8
1368	B7
1371	B7
1372	B8
1373	B7
1374	B7
1376	B7
1382	B7
1389	B6
1404	B7
1406	B6
1420	B7
1424	B8
1427	B7
1428	B7
1429	E9
1430	D9
1431	D9
1432	D9
1433	D9
1435	D8
1442	D9
1443	D9
1444	D9
1445	D8
1450	C7
1458	D8
1461	D8
1462	D8
1463	D8
1465	D8
1467	B9
1469	B9
1471	B7
1476	D6
1480	B9
1481	B9
1482	B9
1484	B7
1492	C9
1504	C8
1506	C8
1511	C8
1513	C8
1514	B8
1515	C7
1516	C8
1517	C8
1520	C7
1522	C8
1523	A7
1527	A7
1534	C8
1537	C9
1541	C8
1542	B9
1546	C8
1548	C9
1550	C8
1556	C8
1557	C8
1564	C8
1565	A8
1571	C8
1578	A9
1579	C8
1581	C8
1582	A9
1583	D9
1586	B8
1587	A8
1588	A8
1589	A8
1590	A8
1591	A8
1592	A8
1593	B8
1594	B8
1595	B7
1596	A8
1597	A9
1598	B8
1599	B8
1601	A8
1602	A7
1613	A8
1615	A8
1618	A8
1619	A8
1621	A8
1623	C7
1629	A7
1630	D6
1633	B6
1634	D6
1636	C7
1637	D9
1638	D6
1639	D6
1640	C8
1641	D6
1642	C7
1646	C7
1647	C6
1649	C6
1650	A7
1651	C6
1652	C6
1655	A9
1656	C6
1658	D7
1659	C6
1662	C6
1666	C9
1668	C6
1682	D6
1683	C6
1691	D6
1703	C7
1705	C7
1706	C7
1708	D6
1710	D6
1711	C6
1712	C7
1713	C7
1715	C7
1719	C7
1720	E9
1740	C6
1741	D6
1742	B6
1743	B6
1744	A9
1745	D6
1747	B6
1748	C5
1749	B6
1750	B6
1751	C6
1757	D6
1758	C7
1761	A7
1762	A7
1766	C6
1767	C7
1770	B7
1771	B6
1775	B7
1777	C7
1778	B7
1779	B8
1791	C7
1792	C7
1795	C8
1796	C7
1797	A9
1799	D6
1801	B7
1813	A7
1815	B9
1818	B9
1819	B7
1820	B6
1894	D6
1899	D7

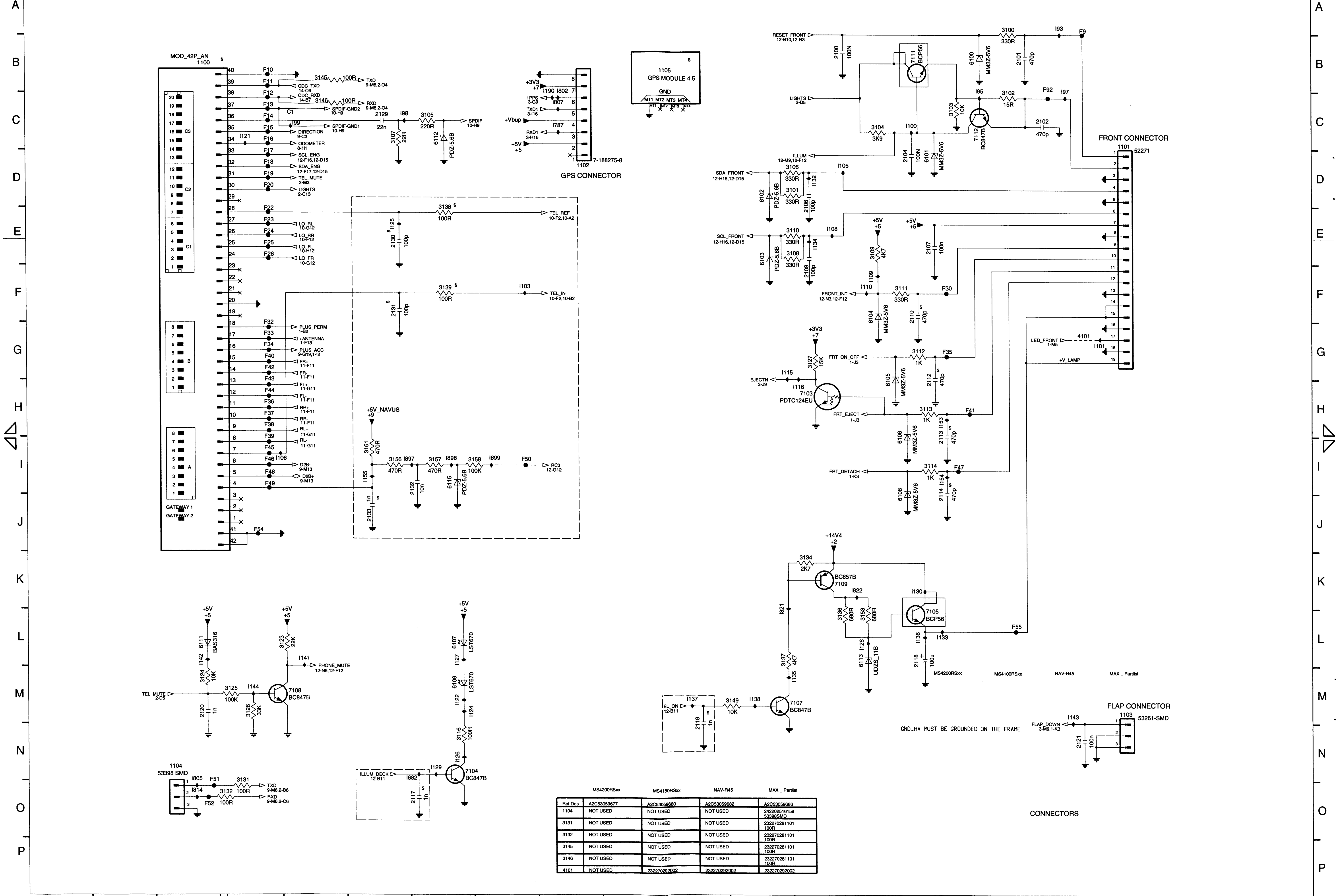
Mk4.5 Main PCB - Circuit 1


PLUS_PERM 2-G5
5000 97u
6961 SMBYT03
6002 UDZS_16B
+14V4 +1
6958 STPS340S
7003 L4938NPD
VS1
VS2
EN
SI
VO1
VO2
ADJ
CT
RES
SO
GND BODY
2002 2m2 16V
POWER_SENSE 12-H12,12-M11
7004 BC847B
7001 BC847B
V_HIGH 12-B6,12-M11,1-I5
V_HIGH_S 1-B10
RESET_IN 1-N7
V_LOW 12-M9,12-B5,1-I5
SET_ON 12-B7,12-N4
POWER_ON 9-G19
7002 VN06NSP
UNDER VOLTAGE
LOGIC
CHARGE PUMP
OVER TEMP
OPEN LOAD
VCC
OUT
IN
STAT
GND
NC
+14V4 +2
7007 VN800
ANTENNA_ON 12-N3,12-B9
+ANTENNA 2-G5
7014 LD1086D2T80
F101 +8Vcd
7005 LF85C
+8V5 +3
+5V +4
+Vbup
+5V_NAVUS +9
7016 LTC1772ES6
7015 SI3443DV
F100 +2V6
7009 LT1376CS-SL30399
BOOST
VIN
SHDN
VSW
BIAS
FB
6006 BAS316
+3V3 +7
7017 BC847B
7018 BC847B
7010 LTC947
VCC3
VCC5
VCCA
GND
PBR_
SRST_
RST_
RST
+3V3_US +10
PWFN 12-B5,6-C7,6-D2,3-N15
+5V_NAVUS +9
7012 LT1376CS-SL30399
6009 BAS316
F102 +5V +5
7008 SAA1305T
NEW-LATCH
OLD-LATCH
COMPARE
MASK
CHNG-INFO
RESET-GENERATOR
RESETPULSE
ON-OFF
V-LOW TIMER
TIMER-START
STATUS
CLOCK & ALARM-TIMER
TAKTGEN & OSCILLATOR
SUPPLY
WATCHDOG
WATCH-TRIG
error-counter
SERIAL I/O
LED_OUT
PLUS_ACC 9-G19,2-G5
FRT_EJECT 2-H14
FRT_ON_OFF 2-G14
FRT_DETACH 2-I14
CD_ON 8-E12
FLAP_DOWN 3-M9,2-N17
SDA_EEP_OLIC 12-F17,12-B14,12-E15
SCL_EEP_OLIC 12-H15,12-D14,12-E15
6004 BAS316
6005 BAS316
CHANGE_INFO 12-G12
7013 PDTC124EU
RESET 12-N7,12-N2,9-C19,1-N7
BST: F95 to GND
TIMER_START 12-B6,12-M10
WATCH_TRIG 12-M10,12-B7
LED_FRONT 2-G17
6008 LSA670
7006 BC847B
CSN 12-M12,12-L13,9-H17
RESET_IN 1-D10
RESET 12-N7,12-N2,9-C19,1-I10
6007 1PS76SB10
Power + ON/OFF

	DP201	DP321	FT101	PA221	PS151	PS211	PS401	SP301	SP431	TD101	TD102	TU001	UP111	UP121	UP331	UP631	UP691
A2C53059677						X					X					X	
A2C53059680			X								X					X	
A2C53059682			X												X		
A2C53059686	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X

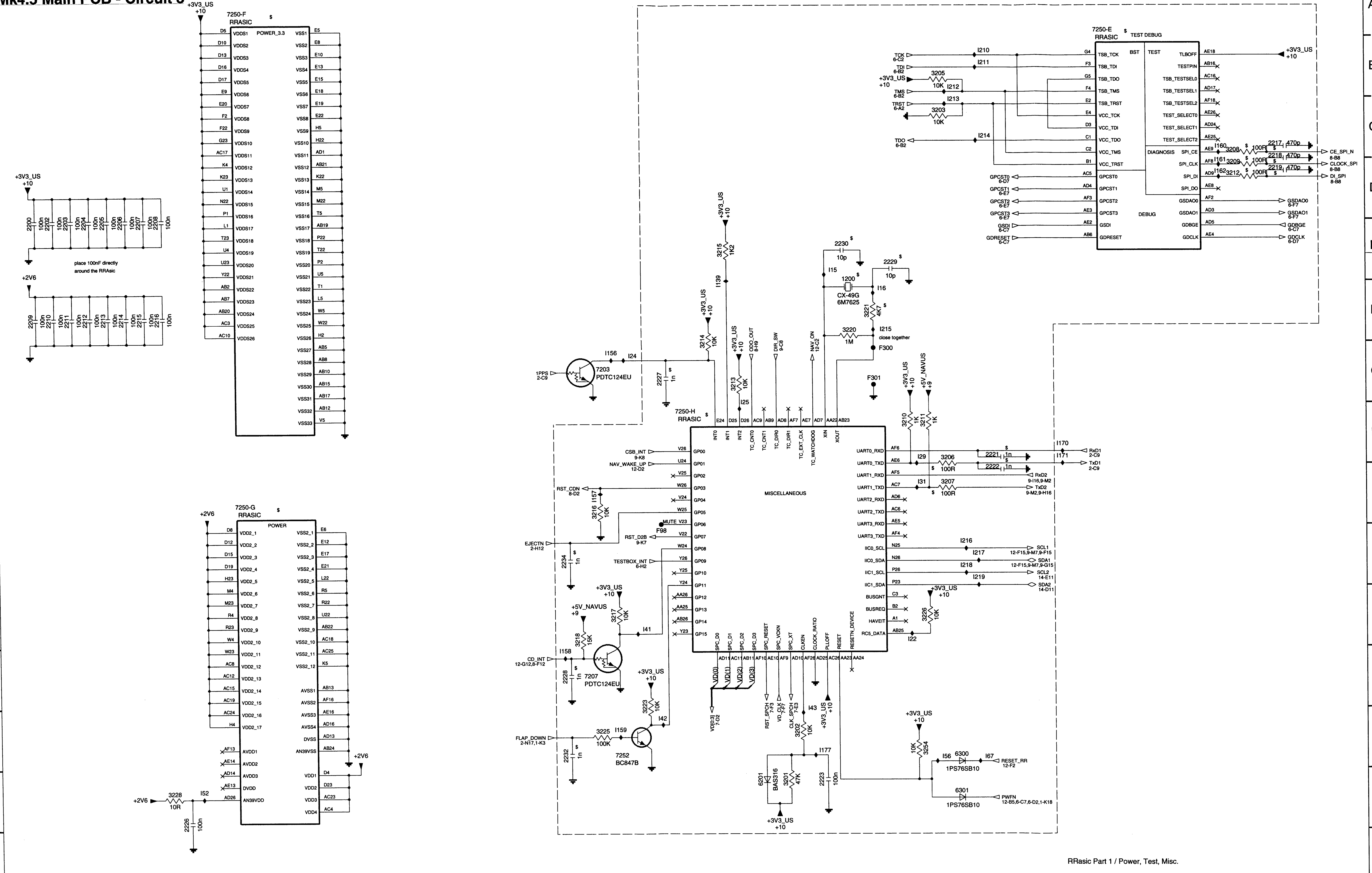
	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
2064	NOT USED	NOT USED	NOT USED	223858655636 10n
6008	932211603668 LSA670	NOT USED	NOT USED	932211603668 LSA670

Mk4.5 Main PCB - Circuit 2


MOD_42P_AN
1100
GATEWAY 1
GATEWAY 2
TXD 9-M6,2-O4
CDC_TXD 14-C6
CDC_RXD 14-B7
RXD 9-M6,2-O4
SPDIF-GND2 10-H9
SPDIF-GND1 10-H9
SPDIF 10-H9
DIRECTION 9-C3
ODOMETER 8-H1
SCL_ENG 12-F16,12-D15
SDA_ENG 12-F17,12-D15
TEL_MUTE 2-M3
LIGHTS 2-C13
LO_RL 10-G12
LO_RR 10-F12
LO_FL 10-H12
LO_FR 10-G12
PLUS_PERM 1-B2
+ANTENNA 1-F13
PLUS_ACC 9-G19,1-I2
FR+ 11-F11
FR- 11-F11
FL+ 11-G11
FL- 11-F11
RR+ 11-F11
RR- 11-F11
RL+ 11-G11
RL- 11-G11
D2B- 9-M13
D2B+ 9-M13
TEL_REF 10-F2,10-A2
TEL_IN 10-F2,10-B2
+5V_NAVUS
RC3 12-G12
GPS CONNECTOR
7-188275-8
1102
+3V3
1PPS 3-G9
TXD1 3-I16
+Vbup
RXD1 3-H16
+5V
1105
GPS MODULE 4.5
GND
MT1 MT2 MT3 MT4
RESET_FRONT 12-B10,12-N3
LIGHTS 2-D5
ILLUM 12-M9,12-F12
SDA_FRONT 12-H15,12-D15
SCL_FRONT 12-H16,12-D15
FRONT_INT 12-N3,12-F12
FRT_ON_OFF 1-J3
EJECTN 3-J9
PDTC124EU
FRT_EJECT 1-J3
FRT_DETACH 1-K3
LED_FRONT 1-M5
+V_LAMP
FRONT CONNECTOR
1101
52271
BCP56
BC847B
BC857B
+14V4
UDZS_11B
EL_ON 12-B11
MS4200RSxx
MS4100RSxx
NAV-R45
MAX _ Partlist
FLAP CONNECTOR
1103
53261-SMD
FLAP_DOWN 3-M9,1-K3
GND_HV MUST BE GROUNDED ON THE FRAME
TEL_MUTE 2-D5
PHONE_MUTE 12-N5,12-F12
BAS316
ILLUM_DECK 12-B11
LST670
1104
53398 SMD
TXD 9-M6,2-B6
RXD 9-M6,2-C6
CONNECTORS

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
1104	NOT USED	NOT USED	NOT USED	242202516159 53398SMD
3131	NOT USED	NOT USED	NOT USED	232270281101 100R
3132	NOT USED	NOT USED	NOT USED	232270281101 100R
3145	NOT USED	NOT USED	NOT USED	232270281101 100R
3146	NOT USED	NOT USED	NOT USED	232270281101 100R
4101	NOT USED	232270292002	232270292002	232270292002

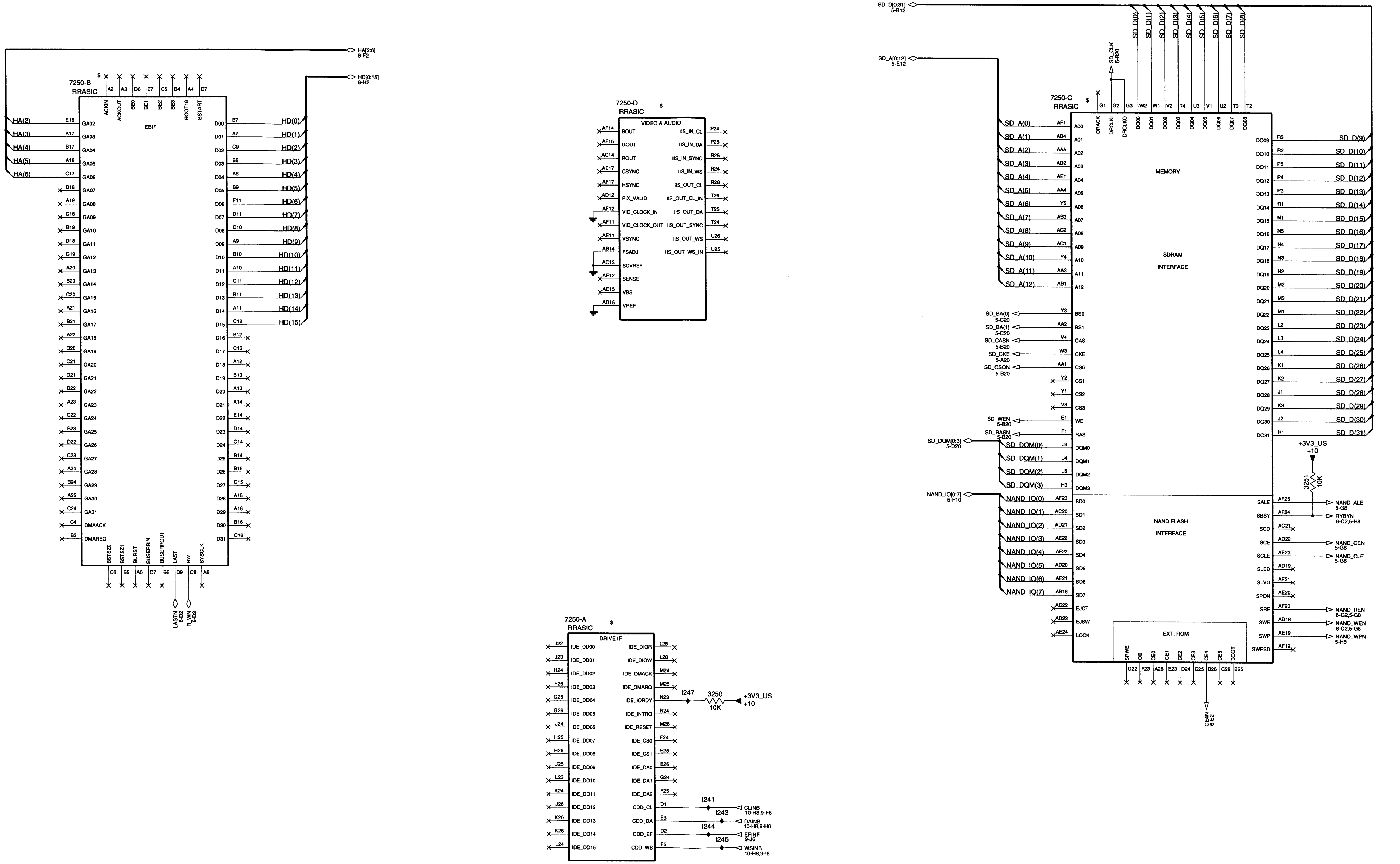
Mk4.5 Main PCB - Circuit 3


7250-F RRASIC POWER_3.3
7250-G RRASIC POWER
7250-E RRASIC TEST DEBUG
7250-H RRASIC MISCELLANEOUS
+3V3_US +10
+2V6
+5V_NAVUS +9
place 100nF directly around the RRasic
TCK 6-C2
TDI 6-B2
TMS 6-B2
TRST 6-A2
TDO 6-B2
CE_SPI_N 8-B8
CLOCK_SPI 8-B8
DI_SPI 8-B8
GSDAO0 6-F7
GSDAO1 6-F7
GDBGE 6-C7
GDCLK 6-D7
GPCST0 6-D7
GPCST1 6-E7
GPCST2 6-E7
GPCST3 6-E7
GSDI 6-C7
GDRESET 6-C7
1200 CX-49G 6M7625
close together
F300
F301
1PPS 2-C9
7203 PDTC124EU
7207 PDTC124EU
7252 BC847B
CSB_INT 9-K8
NAV_WAKE_UP 12-D2
RST_CDN 8-D2
MUTE
F98
RST_D2B 9-K7
EJECTN 2-H12
TESTBOX_INT 6-H2
CD_INT 12-G12,8-F12
FLAP_DOWN 2-N17,1-K3
ODO_OUT 8-H9
DIR_SW 9-C8
NAV_ON 12-C2
RxD1 2-C9
TxD1 2-C9
RxD2 9-I16,9-M2
TxD2 9-M2,9-H16
SCL1 12-F15,9-M7,9-F15
SDA1 12-F15,9-M7,9-G15
SCL2 14-E11
SDA2 14-D11
VD[0:3] 7-D2
RST_SPCH 7-F3
VD_CLK 7-F3
CLK_SPCH 7-E3
6201 BAS316
6300 1PS76SB10
6301 1PS76SB10
RESET_RR 12-F2
PWFN 12-B5,6-C7,6-D2,1-K18

RRasic Part 1 / Power, Test, Misc.

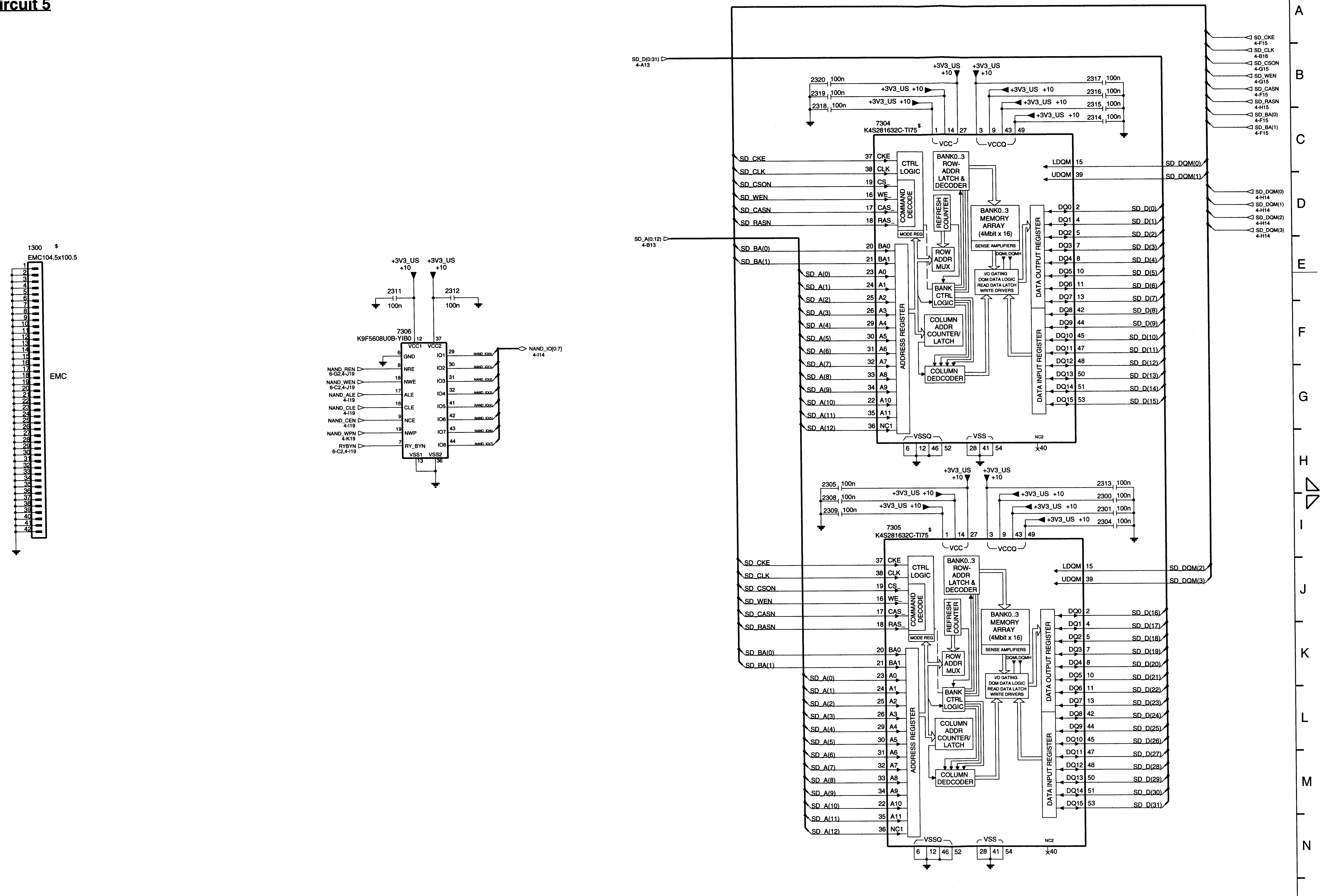
	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
3215	NOT USED	NOT USED	NOT USED	232270281122 1K2

Mk4.5 Main PCB - Circuit 4


7250-B
RRASIC
EBIF
HA[2:6]
6-F2
HD[0:15]
6-H2
HA(2)
HA(3)
HA(4)
HA(5)
HA(6)
HD(0)
HD(1)
HD(2)
HD(3)
HD(4)
HD(5)
HD(6)
HD(7)
HD(8)
HD(9)
HD(10)
HD(11)
HD(12)
HD(13)
HD(14)
HD(15)
ACKIN
ACKOUT
BE0
BE1
BE2
BE3
BOOT16
BSTART
DMAACK
DMAREQ
BSTSZ0
BSTSZ1
BURST
BUSERRIN
BUSERROUT
LAST
RW
SYSCLK
LASTN
6-D2
R_WN
6-D2
7250-D
RRASIC
VIDEO & AUDIO
BOUT
GOUT
ROUT
CSYNC
HSYNC
PIX_VALID
VID_CLOCK_IN
VID_CLOCK_OUT
VSYNC
FSADJ
SCVREF
SENSE
VBS
VREF
IIS_IN_CL
IIS_IN_DA
IIS_IN_SYNC
IIS_IN_WS
IIS_OUT_CL
IIS_OUT_CL_IN
IIS_OUT_DA
IIS_OUT_SYNC
IIS_OUT_WS
IIS_OUT_WS_IN
7250-A
RRASIC
DRIVE IF
IDE_DD00
IDE_DD01
IDE_DD02
IDE_DD03
IDE_DD04
IDE_DD05
IDE_DD06
IDE_DD07
IDE_DD08
IDE_DD09
IDE_DD10
IDE_DD11
IDE_DD12
IDE_DD13
IDE_DD14
IDE_DD15
IDE_DIOR
IDE_DIOW
IDE_DMACK
IDE_DMARQ
IDE_IORDY
IDE_INTRQ
IDE_RESET
IDE_CS0
IDE_CS1
IDE_DA0
IDE_DA1
IDE_DA2
CDD_CL
CDD_DA
CDD_EF
CDD_WS
I247
3250
10K
+3V3_US
+10
I241
I243
I244
I246
CLINB
10-H8,9-F6
DAINB
10-H8,9-H6
EFINF
9-J6
WSINB
10-H8,9-I6
7250-C
RRASIC
SD_D[0:31]
5-B12
SD_A[0:12]
5-E12
SD_CLK
5-B20
SD_D(0)
SD_D(1)
SD_D(2)
SD_D(3)
SD_D(4)
SD_D(5)
SD_D(6)
SD_D(7)
SD_D(8)
DRACK
DRCLKI
DRCLKO
MEMORY
SDRAM
INTERFACE
SD_A(0)
SD_A(1)
SD_A(2)
SD_A(3)
SD_A(4)
SD_A(5)
SD_A(6)
SD_A(7)
SD_A(8)
SD_A(9)
SD_A(10)
SD_A(11)
SD_A(12)
SD_BA(0)
5-C20
SD_BA(1)
5-C20
SD_CASN
5-B20
SD_CKE
5-A20
SD_CSON
5-B20
SD_WEN
5-B20
SD_RASN
5-B20
SD_DQM[0:3]
5-D20
SD_DQM(0)
SD_DQM(1)
SD_DQM(2)
SD_DQM(3)
SD_D(9)
SD_D(10)
SD_D(11)
SD_D(12)
SD_D(13)
SD_D(14)
SD_D(15)
SD_D(16)
SD_D(17)
SD_D(18)
SD_D(19)
SD_D(20)
SD_D(21)
SD_D(22)
SD_D(23)
SD_D(24)
SD_D(25)
SD_D(26)
SD_D(27)
SD_D(28)
SD_D(29)
SD_D(30)
SD_D(31)
+3V3_US
+10
3251
10K
NAND_IO[0:7]
5-F10
NAND_IO(0)
NAND_IO(1)
NAND_IO(2)
NAND_IO(3)
NAND_IO(4)
NAND_IO(5)
NAND_IO(6)
NAND_IO(7)
NAND FLASH
INTERFACE
NAND_ALE
5-G8
RYBYN
6-C2,5-H8
NAND_CEN
5-G8
NAND_CLE
5-G8
NAND_REN
6-G2,5-G8
NAND_WEN
6-C2,5-G8
NAND_WPN
5-H8
EJCT
EJSW
LOCK
EXT. ROM
SRWE
OE
CE0
CE1
CE2
CE3
CE4
CE5
BOOT
CE4N
6-E2
SALE
SBSY
SCD
SCE
SCLE
SLED
SLVD
SPON
SRE
SWE
SWP
SWPSD

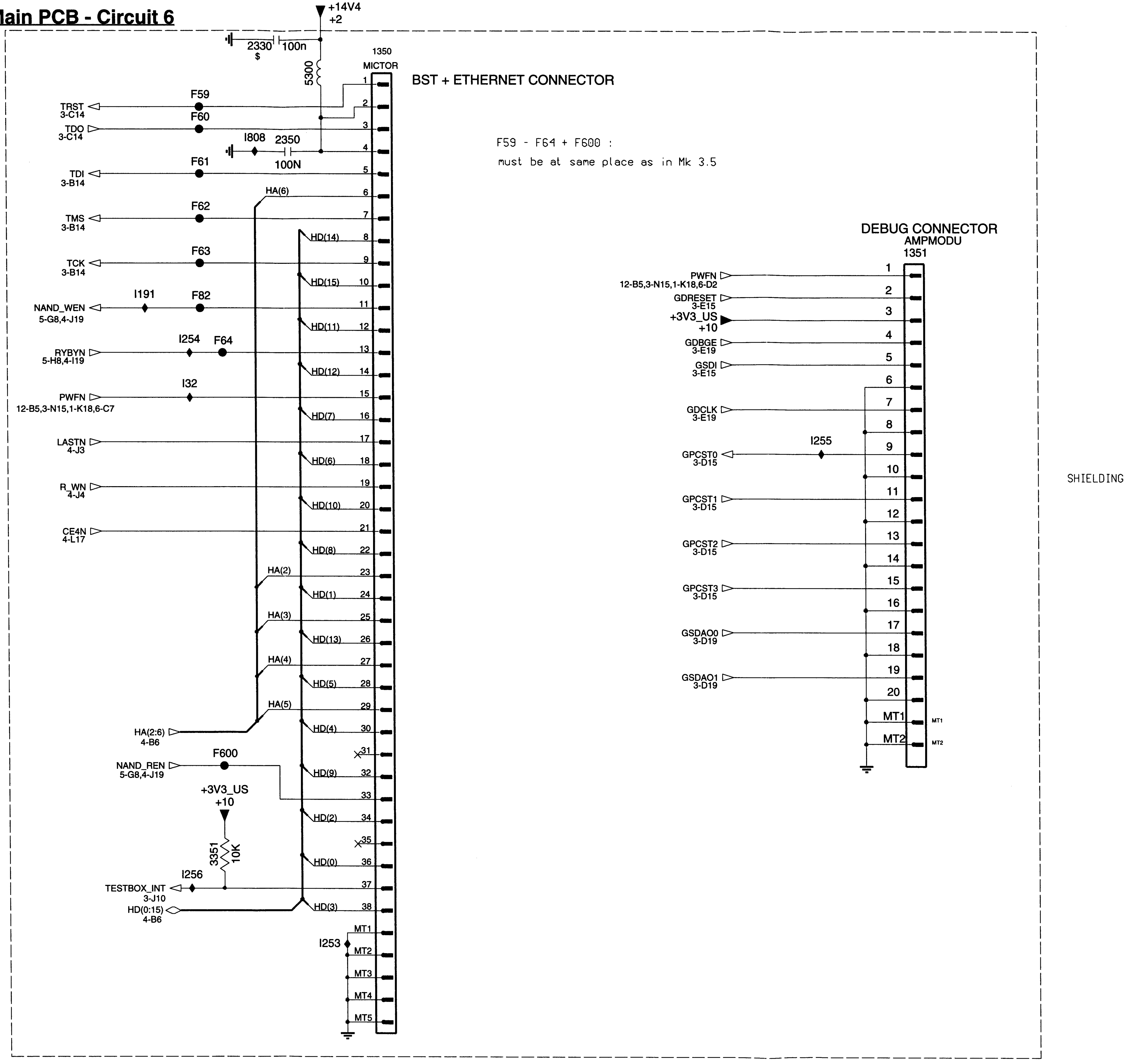
RRasic Part 2, Drive, Memory

Mk4.5 Main PCB - Circuit 5


1300
EMC104.5x100.5
EMC
+3V3_US +10
2311 100n
2312 100n
7306
K9F5608U0B-YIB0
VCC1
VCC2
GND
NRE
NWE
ALE
CLE
NCE
NWP
RY_BYN
VSS1
VSS2
IO1
IO2
IO3
IO4
IO5
IO6
IO7
IO8
NAND_REN 6-G2,4-J19
NAND_WEN 6-C2,4-J19
NAND_ALE 4-I19
NAND_CLE 4-I19
NAND_CEN 4-I19
NAND_WPN 4-K19
RYBYN 6-C2,4-I19
NAND_IO[0:7] 4-I14
SD_D(0:31) 4-A13
SD_A(0:12) 4-B13
7304
K4S281632C-TI75
7305
K4S281632C-TI75
2320 100n
2319 100n
2318 100n
2317 100n
2316 100n
2315 100n
2314 100n
2305 100n
2308 100n
2309 100n
2313 100n
2300 100n
2301 100n
2304 100n
VCC
VCCQ
VSSQ
VSS
NC2
CTRL LOGIC
COMMAND DECODE
MODE REG
BANK0..3 ROW-ADDR LATCH & DECODER
REFRESH COUNTER
ROW ADDR MUX
BANK CTRL LOGIC
COLUMN ADDR COUNTER/ LATCH
COLUMN DEDCODER
BANK0..3 MEMORY ARRAY (4Mbit x 16)
SENSE AMPLIFIERS
DQML DQMH
I/O GATING DQM DATA LOGIC READ DATA LATCH WRITE DRIVERS
ADDRESS REGISTER
DATA OUTPUT REGISTER
DATA INPUT REGISTER
CKE
CLK
CS
WE
CAS
RAS
BA0
BA1
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
NC1
LDQM
UDQM
DQ0
DQ1
DQ2
DQ3
DQ4
DQ5
DQ6
DQ7
DQ8
DQ9
DQ10
DQ11
DQ12
DQ13
DQ14
DQ15
SD_CKE 4-F15
SD_CLK 4-B16
SD_CSON 4-G15
SD_WEN 4-G15
SD_CASN 4-F15
SD_RASN 4-H15
SD_BA(0) 4-F15
SD_BA(1) 4-F15
SD_DQM(0) 4-H14
SD_DQM(1) 4-H14
SD_DQM(2) 4-H14
SD_DQM(3) 4-H14

SDRAM, NAND

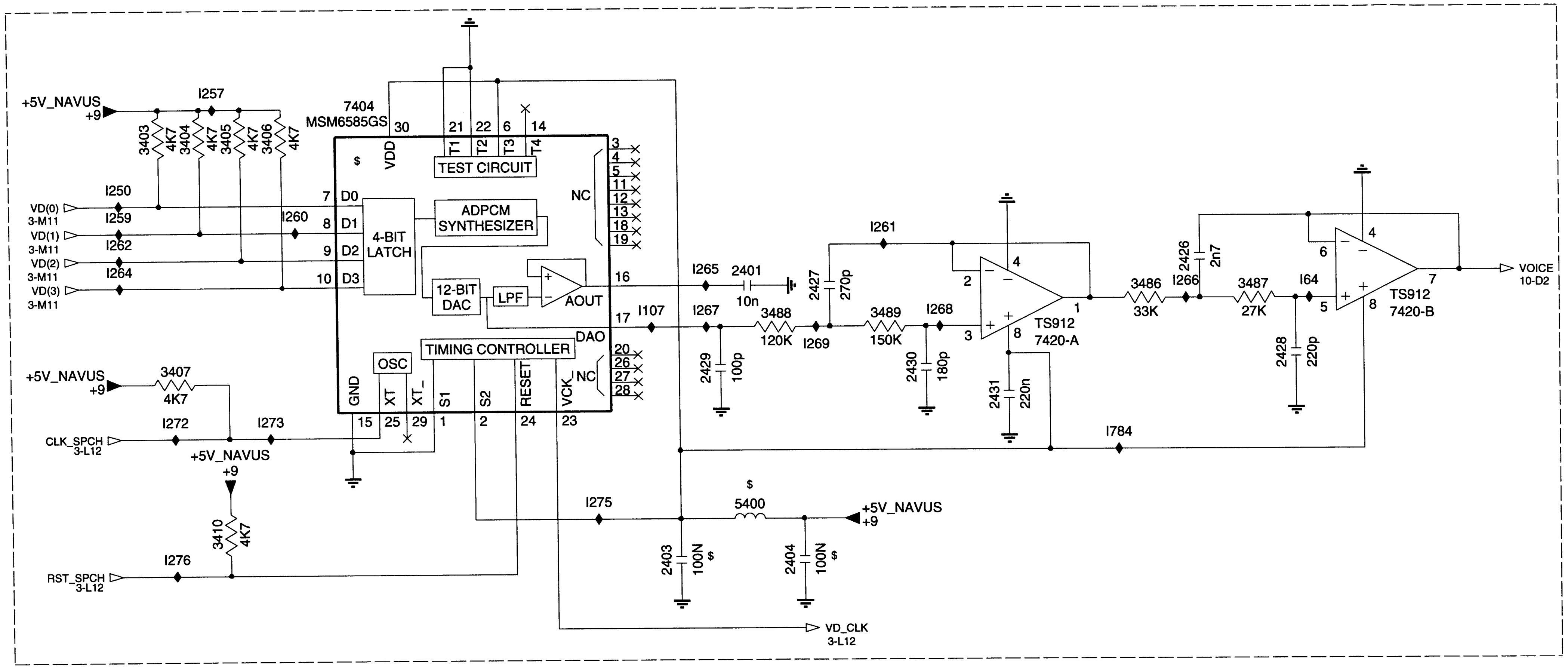
Mk4.5 Main PCB - Circuit 6


+14V4
+2
2330
$
100n
5300
1350
MICTOR
BST + ETHERNET CONNECTOR
TRST 3-C14
F59
TDO 3-C14
F60
I808
2350
100N
TDI 3-B14
F61
HA(6)
TMS 3-B14
F62
HD(14)
TCK 3-B14
F63
HD(15)
NAND_WEN 5-G8,4-J19
I191
F82
HD(11)
RYBYN 5-H8,4-I19
I254
F64
HD(12)
PWFN 12-B5,3-N15,1-K18,6-C7
I32
HD(7)
LASTN 4-J3
HD(6)
R_WN 4-J4
HD(10)
CE4N 4-L17
HD(8)
HA(2)
HD(1)
HA(3)
HD(13)
HA(4)
HD(5)
HA(5)
HD(4)
HA(2:6) 4-B6
NAND_REN 5-G8,4-J19
F600
HD(9)
+3V3_US
+10
3351
10K
HD(2)
HD(0)
I256
TESTBOX_INT 3-J10
HD(0:15) 4-B6
HD(3)
I253
MT1
MT2
MT3
MT4
MT5
F59 - F64 + F600 :
must be at same place as in Mk 3.5
DEBUG CONNECTOR
AMPMODU
1351
PWFN 12-B5,3-N15,1-K18,6-D2
GDRESET 3-E15
+3V3_US +10
GDBGE 3-E19
GSDI 3-E15
GDCLK 3-E19
I255
GPCST0 3-D15
GPCST1 3-D15
GPCST2 3-D15
GPCST3 3-D15
GSDAO0 3-D19
GSDAO1 3-D19
SHIELDING

TEST CONNECTORS

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
1350	NOT USED	NOT USED	NOT USED	821103923090 MICTOR BST+ETHERNETCONNECTOR
1351	NOT USED	NOT USED	NOT USED	821103923100 AMPMODU DEBUGCONNECTOR
2350	NOT USED	NOT USED	NOT USED	222291055649 100N
5300	NOT USED	NOT USED	NOT USED	242254944392

Mk4.5 Main PCB - Circuit 7



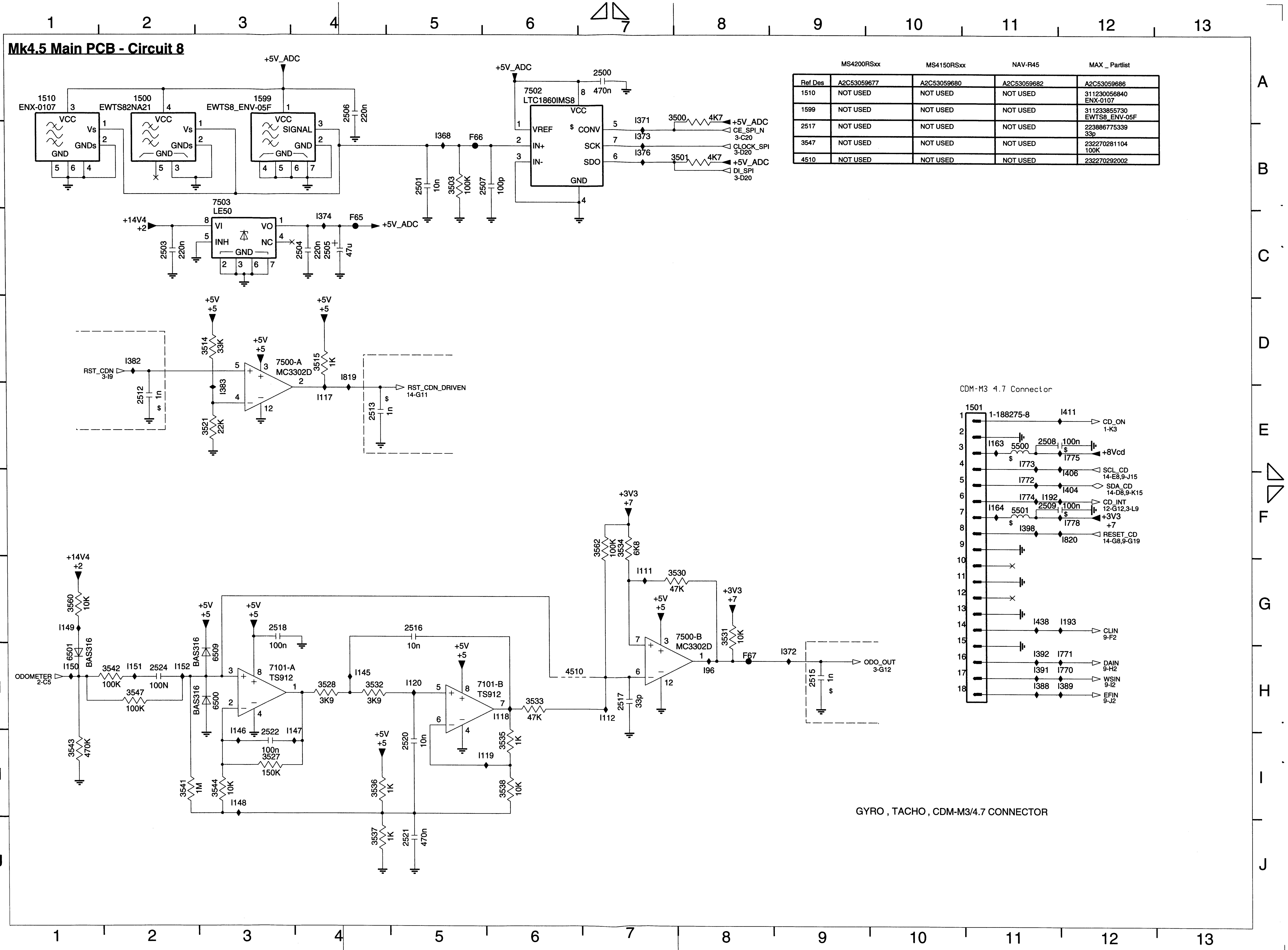
+5V_NAVUS
+9
I257
3403 4K7
3404 4K7
3405 4K7
3406 4K7
7404
MSM6585GS
30
VDD
21 22 6 14
T1 T2 T3 T4
TEST CIRCUIT
$
I250
VD(0) 3-M11
I259
VD(1) 3-M11
I262
VD(2) 3-M11
I264
VD(3) 3-M11
I260
7 D0
8 D1
9 D2
10 D3
4-BIT LATCH
ADPCM SYNTHESIZER
12-BIT DAC
LPF
AOUT
16
17
DAO
NC
3 4 5 11 12 13 18 19
20 26 27 28
TIMING CONTROLLER
OSC
GND XT XT_ S1 S2 RESET VCK_
15 25 29 1 2 24 23
+5V_NAVUS
+9
3407 4K7
CLK_SPCH 3-L12
I272
I273
+5V_NAVUS
+9
3410 4K7
RST_SPCH 3-L12
I276
I275
$
5400
+5V_NAVUS
+9
2403 100N $
2404 100N $
VD_CLK 3-L12
I265
2401 10n
I107
I267
3488 120K
I269
2429 100p
2427 270p
I261
3489 150K
I268
2430 180p
2 3 4 8 1
TS912 7420-A
2431 220n
I784
3486 33K
I266
2426 2n7
3487 27K
I64
2428 220p
6 5 4 8 7
TS912 7420-B
VOICE 10-D2

2403, 5400, 2404 to be placed close to pin 30

NAV VOICE

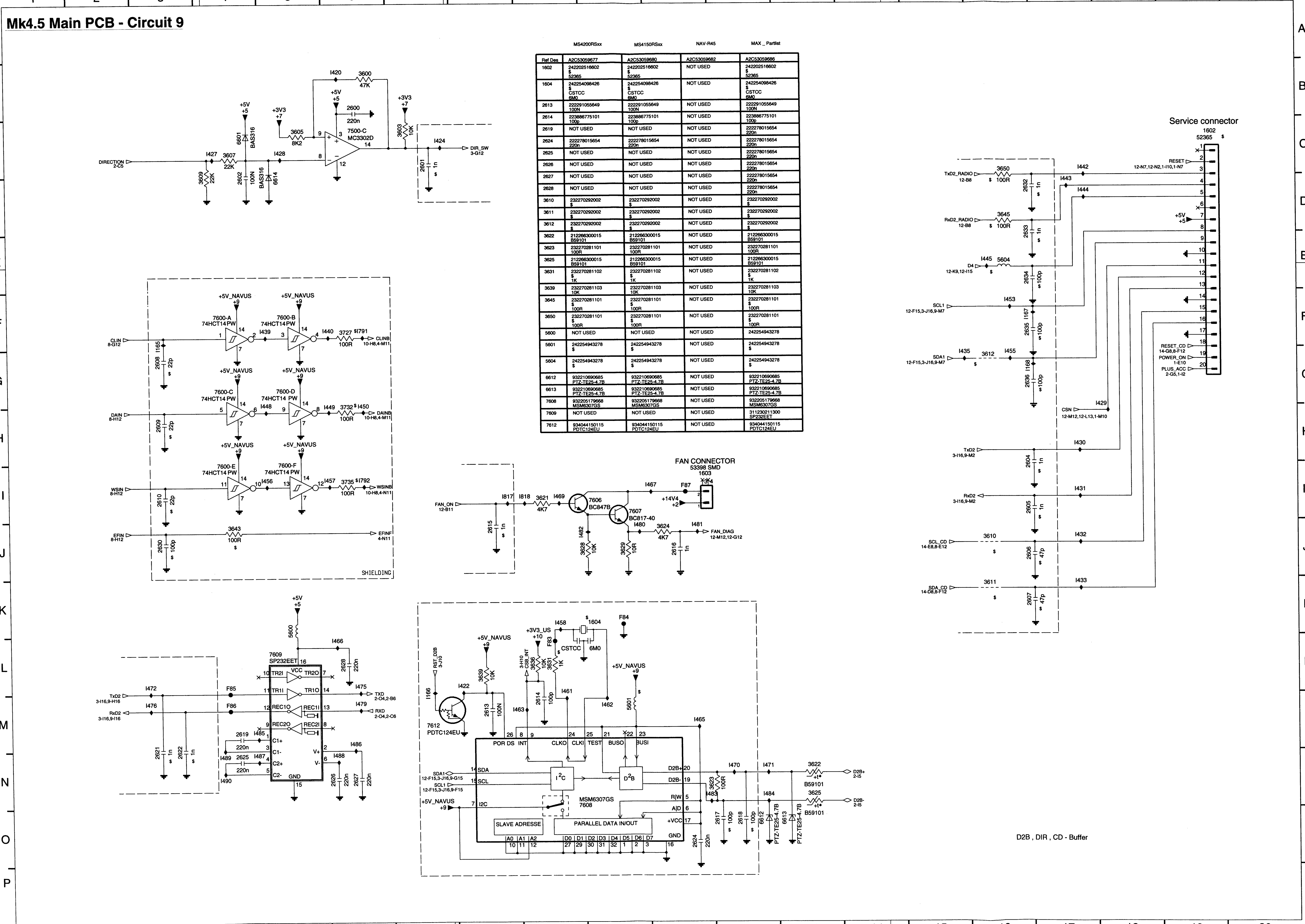
Mk4.5 Main PCB - Circuit 8

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
1510	NOT USED	NOT USED	NOT USED	311230056840 ENX-0107
1599	NOT USED	NOT USED	NOT USED	311233855730 EWTS8_ENV-05F
2517	NOT USED	NOT USED	NOT USED	223886775339 33p
3547	NOT USED	NOT USED	NOT USED	232270281104 100K
4510	NOT USED	NOT USED	NOT USED	232270292002


1 2 3 4 5 6 7 8 9 10 11 12 13
A B C D E F G H I J
+5V_ADC
1510
ENX-0107
1500
EWTS82NA21
1599
EWTS8_ENV-05F
VCC
Vs
GNDs
GND
SIGNAL
2506
220n
7502
LTC1860IMS8
2500
470n
VREF
IN+
IN-
CONV
SCK
SDO
I368
F66
2501
10n
3503
100K
2507
100p
I371
I373
I376
3500
4K7
3501
4K7
CE_SPI_N
3-C20
CLOCK_SPI
3-D20
DI_SPI
3-D20
7503
LE50
+14V4
+2
VI
VO
INH
NC
2503
220n
2504
220n
2505
47u
I374
F65
+5V
+5
3514
33K
3521
22K
I382
RST_CDN
3-I9
2512
1n
I383
7500-A
MC3302D
3515
1K
I117
I819
RST_CDN_DRIVEN
14-G11
2513
1n
CDM-M3 4.7 Connector
1501
1-188275-8
I411
CD_ON
1-K3
I163
5500
2508
100n
I775
+8Vcd
I773
I406
SCL_CD
14-E8,9-J15
I772
I404
SDA_CD
14-D8,9-K15
I774
I192
CD_INT
12-G12,3-L9
I164
5501
2509
100n
I778
+3V3
+7
I398
I820
RESET_CD
14-G8,9-G19
I438
I193
CLIN
9-F2
I392
I771
DAIN
9-H2
I391
I770
WSIN
9-I2
I388
I389
EFIN
9-J2
3560
10K
I149
6501
BAS316
I150
ODOMETER
2-C5
3542
100K
I151
2524
100N
I152
3547
100K
3543
470K
6509
6500
2518
100n
7101-A
TS912
I146
2522
100n
I147
3527
150K
3541
1M
3544
10K
I148
3528
3K9
I145
3532
3K9
2516
10n
I120
7101-B
TS912
2520
10n
3536
1K
3537
1K
2521
470n
I118
I119
3535
1K
3538
10K
3533
47K
I112
4510
3562
100K
3534
6K8
I111
3530
47K
7500-B
MC3302D
I96
2517
33p
3531
10K
F67
I372
2515
1n
ODO_OUT
3-G12

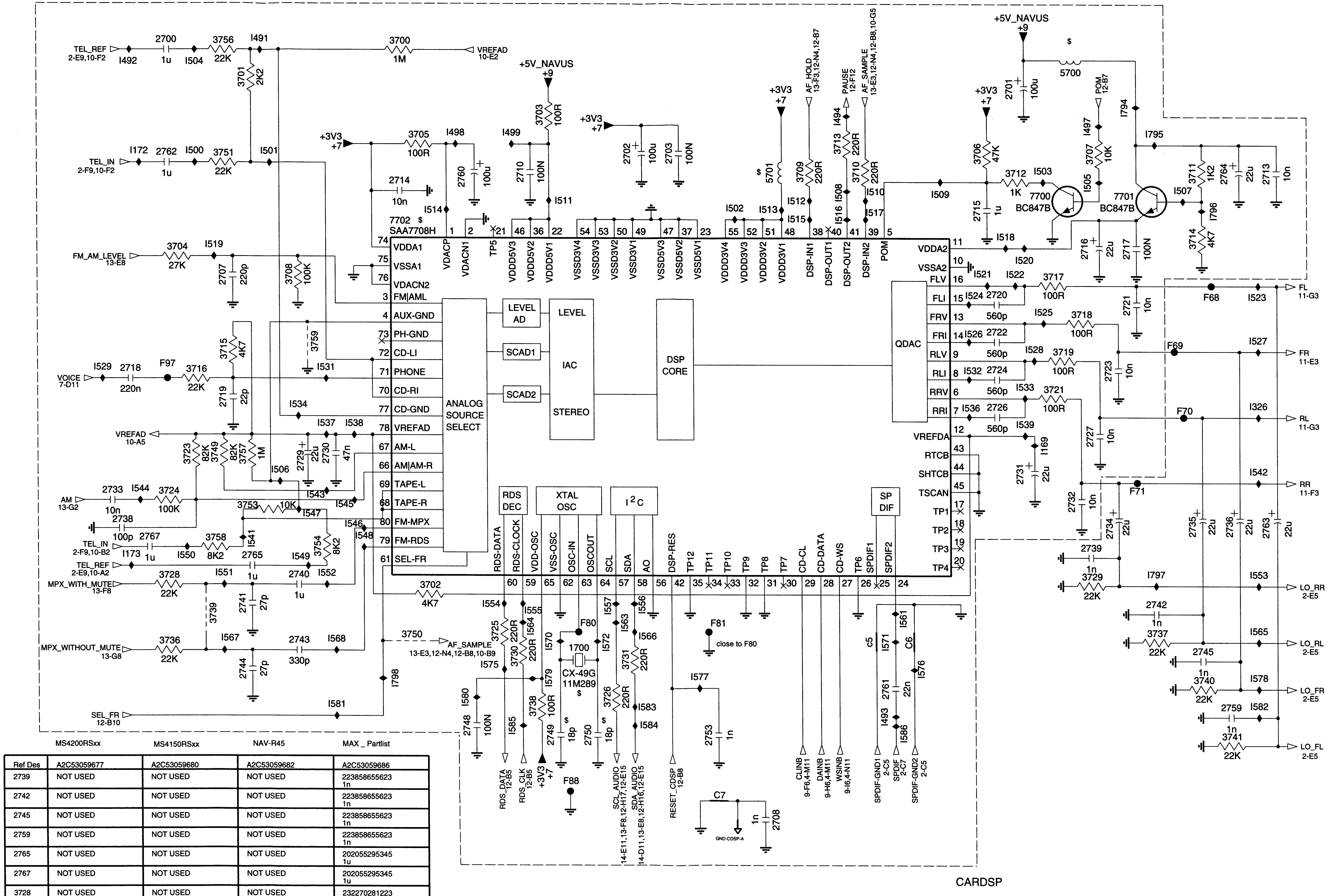
GYRO , TACHO , CDM-M3/4.7 CONNECTOR

Mk4.5 Main PCB - Circuit 9


DIRECTION 2-C5
I427
3607 22K
3609 22K
+5V +5
6601 BAS316
2602 100N
6614 BAS316
+3V3 +7
3605 8K2
I428
I420
3600 47K
+5V +5
2600 220n
7500-C MC3302D
+3V3 +7
3603 10K
I424
DIR_SW 3-G12
2601 1n
+5V_NAVUS +9
7600-A 74HCT14PW
7600-B 74HCT14PW
CLIN 8-G12
I165
2608 22p
I439
I440
3727 100R
I791
CLINB 10-H8,4-M11
7600-C 74HCT14PW
7600-D 74HCT14 PW
DAIN 8-H12
2609 22p
I448
I449
3732 100R
I450
DAINB 10-H8,4-M11
7600-E 74HCT14PW
7600-F 74HCT14PW
WSIN 8-H12
2610 22p
I456
I457
3735 100R
I792
WSINB 10-H8,4-N11
EFIN 8-H12
2630 100p
3643 100R
EFINF 4-N11
SHIELDING
FAN CONNECTOR
53398 SMD
1603
FAN_ON 12-B11
I817
I818
3621 4K7
I469
7606 BC847B
I467
F87
+14V4 +2
7607 BC817-40
I480
3624 4K7
I481
FAN_DIAG 12-M12,12-G12
2615 1n
I482
3628 10K
3629 10R
2616 1n
+5V +5
5600
I466
7609 SP232EET
2628 220n
TR2I TR2O
TR1I TR1O
REC1O REC1I
REC2O REC2I
VCC
C1+ C1- C2+ C2- V+ V- GND
TxD2 3-I16,9-H16
RxD2 3-I16,9-I16
I472
I476
F85
F86
I475
TXD 2-O4,2-B6
I479
RXD 2-O4,2-C6
2619 220n
I485
I489
2625 220n
I487
I490
2621 1n
2622 1n
I486
I488
2626 220n
2627 220n
RST_D2B 3-J10
I166
7612 PDTC124EU
I422
+5V_NAVUS +9
3639 10K
2613 100N
3-H10 CS9_INT
+3V3_US +10
3636 10K
F83
3631 1K
I458
1604
CSTCC 6M0
F84
2614 100p
I461
I463
I462
+5V_NAVUS +9
5601
I465
POR DS INT CLKO CLKI TEST BUSO BUSI
SDA1 12-F15,3-J16,9-G15
SCL1 12-F15,3-J16,9-F15
SDA SCL
I²C
D²B
MSM6307GS 7608
I2C
SLAVE ADRESSE
PARALLEL DATA IN/OUT
A0 A1 A2 D0 D1 D2 D3 D4 D5 D6 D7
D2B+ D2B- R/W A/D +VCC GND
+5V_NAVUS +9
2624 220n
I470
I471
3623 100R
I483
I484
2617 100p
2618 100p
6612 PTZ-TE25-4.7B
6613 PTZ-TE25-4.7B
3622 B59101
3625 B59101
D2B+ 2-I5
D2B- 2-I5
Service connector
1602
52365
RESET 12-N7,12-N2,1-I10,1-N7
TxD2_RADIO 12-B8
3650 100R
2632 1n
I442
I443
I444
RxD2_RADIO 12-B8
3645 100R
2633 1n
+5V +5
D4 12-K9,12-I15
I445
5604
2634 100p
SCL1 12-F15,3-J16,9-M7
I453
I167
2635 100p
SDA1 12-F15,3-J16,9-M7
I435
3612
I455
I168
2636 100p
RESET_CD 14-G8,8-F12
POWER_ON 1-E10
PLUS_ACC 2-G5,1-I2
CSN 12-M12,12-L13,1-M10
I429
TxD2 3-I16,9-M2
I430
2604 1n
RxD2 3-I16,9-M2
I431
2605 1n
SCL_CD 14-E8,8-E12
3610
I432
2606 47p
SDA_CD 14-D8,8-F12
3611
I433
2607 47p
D2B , DIR , CD - Buffer

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
1602	242202516602 $ 52365	242202516602 $ 52365	NOT USED	242202516602 $ 52365
1604	242254098426 $ CSTCC 6M0	242254098426 $ CSTCC 6M0	NOT USED	242254098426 $ CSTCC 6M0
2613	222291055649 100N	222291055649 100N	NOT USED	222291055649 100N
2614	223886775101 100p	223886775101 100p	NOT USED	223886775101 100p
2619	NOT USED	NOT USED	NOT USED	222278015654 220n
2624	222278015654 220n	222278015654 220n	NOT USED	222278015654 220n
2625	NOT USED	NOT USED	NOT USED	222278015654 220n
2626	NOT USED	NOT USED	NOT USED	222278015654 220n
2627	NOT USED	NOT USED	NOT USED	222278015654 220n
2628	NOT USED	NOT USED	NOT USED	222278015654 220n
3610	232270292002 $	232270292002 $	NOT USED	232270292002 $
3611	232270292002 $	232270292002 $	NOT USED	232270292002 $
3612	232270292002 $	232270292002 $	NOT USED	232270292002 $
3622	212266300015 B59101	212266300015 B59101	NOT USED	212266300015 B59101
3623	232270281101 100R	232270281101 100R	NOT USED	232270281101 100R
3625	212266300015 B59101	212266300015 B59101	NOT USED	212266300015 B59101
3631	232270281102 $ 1K	232270281102 $ 1K	NOT USED	232270281102 $ 1K
3639	232270281103 10K	232270281103 10K	NOT USED	232270281103 10K
3645	232270281101 $ 100R	232270281101 $ 100R	NOT USED	232270281101 $ 100R
3650	232270281101 $ 100R	232270281101 $ 100R	NOT USED	232270281101 $ 100R
5600	NOT USED	NOT USED	NOT USED	242254943278
5601	242254943278 $	242254943278 $	NOT USED	242254943278 $
5604	242254943278 $	242254943278 $	NOT USED	242254943278 $
6612	932210690685 PTZ-TE25-4.7B	932210690685 PTZ-TE25-4.7B	NOT USED	932210690685 PTZ-TE25-4.7B
6613	932210690685 PTZ-TE25-4.7B	932210690685 PTZ-TE25-4.7B	NOT USED	932210690685 PTZ-TE25-4.7B
7608	932205179668 MSM6307GS	932205179668 MSM6307GS	NOT USED	932205179668 MSM6307GS
7609	NOT USED	NOT USED	NOT USED	311230211300 SP232EET
7612	934044150115 PDTC124EU	934044150115 PDTC124EU	NOT USED	934044150115 PDTC124EU

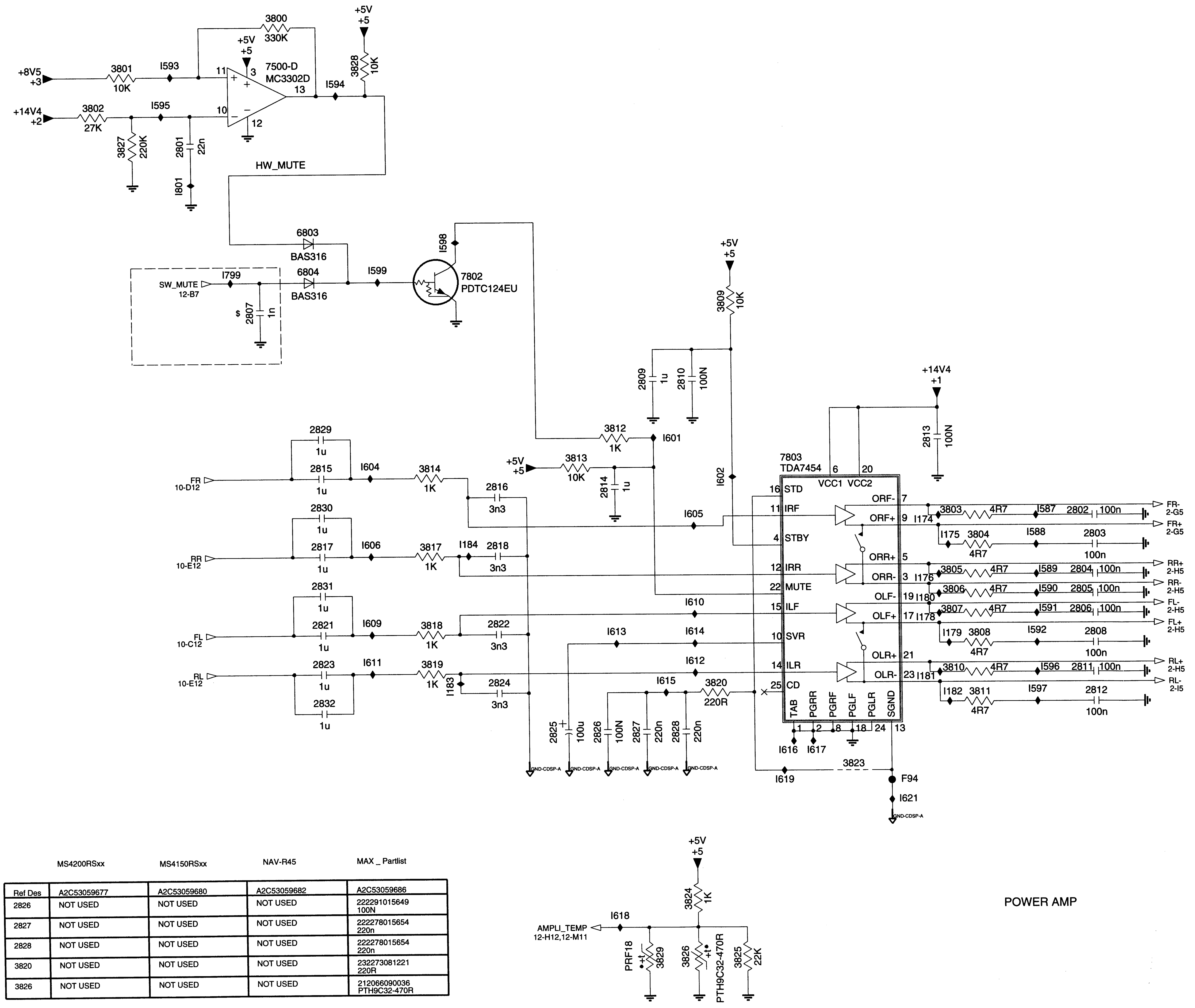
Mk4.5 Main PCB - Circuit 10



TEL_REF 2-E9,10-F2
TEL_IN 2-F9,10-F2
FM_AM_LEVEL 13-E8
VOICE 7-D11
VREFAD 10-A5
VREFAD 10-E2
AM 13-G2
TEL_IN 2-F9,10-B2
TEL_REF 2-E9,10-A2
MPX_WITH_MUTE 13-F8
MPX_WITHOUT_MUTE 13-G8
SEL_FR 12-B10
AF_SAMPLE 13-E3,12-N4,12-B8,10-B9
+5V_NAVUS +9
+3V3 +7
AF_HOLD 13-F3,12-N4,12-B7
PAUSE 12-F12
AF_SAMPLE 13-E3,12-N4,12-B8,10-G5
POM 12-B7
7702 SAA7708H
ANALOG SOURCE SELECT
LEVEL AD
SCAD1
SCAD2
LEVEL
IAC
STEREO
DSP CORE
QDAC
RDS DEC
XTAL OSC
I2C
SP DIF
VDDA1
VSSA1
VDACN2
FM|AML
AUX-GND
PH-GND
CD-LI
PHONE
CD-RI
CD-GND
VREFAD
AM-L
AM|AM-R
TAPE-L
TAPE-R
FM-MPX
FM-RDS
SEL-FR
VDACP
VDACN1
TP5
VDDD5V3
VDDD5V2
VDDD5V1
VSSD3V4
VSSD3V3
VSSD3V2
VSSD3V1
VSSD5V3
VSSD5V2
VSSD5V1
VDDD3V4
VDDD3V3
VDDD3V2
VDDD3V1
DSP-IN1
DSP-OUT1
DSP-OUT2
DSP-IN2
POM
VDDA2
VSSA2
FLV
FLI
FRV
FRI
RLV
RLI
RRV
RRI
VREFDA
RTCB
SHTCB
TSCAN
TP1
TP2
TP3
TP4
RDS-DATA
RDS-CLOCK
VDD-OSC
VSS-OSC
OSC-IN
OSCOUT
SCL
SDA
AO
DSP-RES
TP12
TP11
TP10
TP9
TP8
TP7
CD-CL
CD-DATA
CD-WS
TP6
SPDIF1
SPDIF2
7700 BC847B
7701 BC847B
1700 CX-49G 11M289
5700
5701
FL 11-G3
FR 11-E3
RL 11-G3
RR 11-F3
LO_RR 2-E5
LO_RL 2-E5
LO_FR 2-E5
LO_FL 2-E5
F68
F69
F70
F71
F80
F81 close to F80
F88
F97
RDS_DATA 12-B5
RDS_CLK 12-B5
SCL_AUDIO 14-E11,13-F8,12-H17,12-E15
SDA_AUDIO 14-D11,13-E8,12-H16,12-E15
RESET_CDSP 12-B8
CLINB 9-F6,4-M11
DAINB 9-H6,4-M11
WSINB 9-I6,4-N11
SPDIF-GND1 2-C5
SPDIF 2-C7
SPDIF-GND2 2-C5
C5
C6
C7
GND-CDSP-A
CARDSP

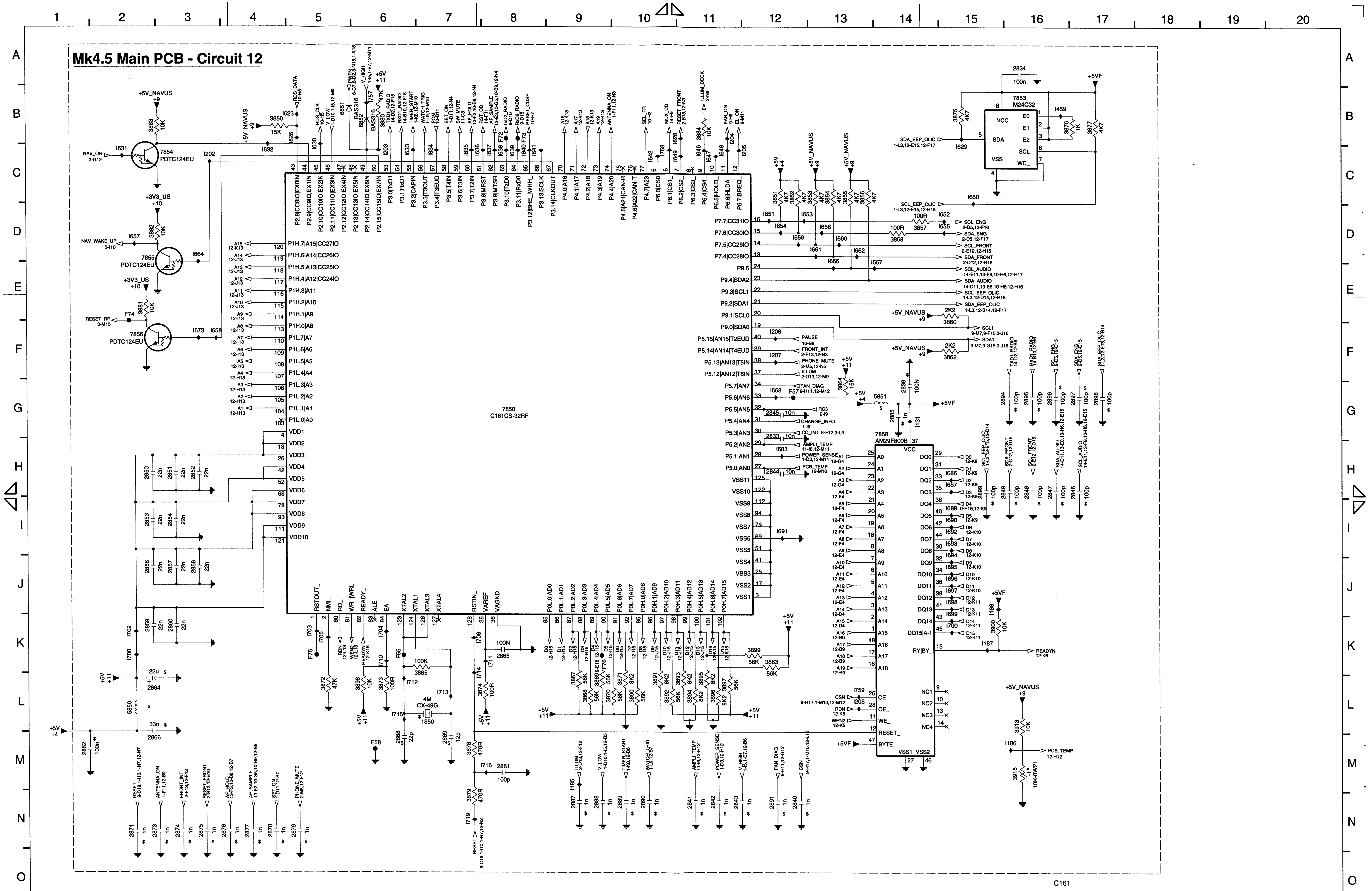
Ref Des	MS4200RSxx A2C53059677	MS4150RSxx A2C53059680	NAV-R45 A2C53059682	MAX _ Partlist A2C53059686
2739	NOT USED	NOT USED	NOT USED	223858655623 1n
2742	NOT USED	NOT USED	NOT USED	223858655623 1n
2745	NOT USED	NOT USED	NOT USED	223858655623 1n
2759	NOT USED	NOT USED	NOT USED	223858655623 1n
2765	NOT USED	NOT USED	NOT USED	202055295345 1u
2767	NOT USED	NOT USED	NOT USED	202055295345 1u
3728	NOT USED	NOT USED	NOT USED	232270281223 22K
3750	NOT USED	NOT USED	NOT USED	232270292002
3753	NOT USED	NOT USED	NOT USED	232270281103 10K
3754	NOT USED	NOT USED	NOT USED	232270281822 8K2
3757	NOT USED	NOT USED	NOT USED	232270281105 1M
3758	NOT USED	NOT USED	NOT USED	232270281822 8K2

Mk4.5 Main PCB - Circuit 11


+8V5
+3
+14V4
+2
3801
10K
3802
27K
3827
220K
2801
22n
I801
I593
I595
3800
330K
+5V
+5
7500-D
MC3302D
I594
3828
10K
HW_MUTE
6803
BAS316
6804
BAS316
SW_MUTE
12-B7
I799
2807
1n
I599
I598
7802
PDTC124EU
3809
10K
2809
1u
2810
100N
+14V4
+1
2813
100N
2829
1u
2815
FR
10-D12
I604
3814
1K
2816
3n3
3812
1K
I601
3813
10K
2814
I602
I605
2830
2817
RR
10-E12
I606
3817
I184
2818
I610
2831
2821
FL
10-C12
I609
3818
2822
I613
I614
I612
2823
RL
10-E12
I611
3819
I183
2824
2832
I615
3820
220R
2825
100u
2826
100N
2827
220n
2828
220n
GND-CDSP-A
7803
TDA7454
VCC1
VCC2
STD
IRF
STBY
IRR
MUTE
ILF
SVR
ILR
CD
TAB
PGRR
PGRF
PGLF
PGLR
SGND
ORF-
ORF+
ORR+
ORR-
OLF-
OLF+
OLR+
OLR-
I616
I617
3823
I619
F94
I621
3803
4R7
I587
2802
100n
FR-
2-G5
FR+
2-G5
I174
I175
3804
I588
2803
3805
I589
2804
RR+
2-H5
RR-
2-H5
I176
3806
I590
2805
I180
3807
I591
2806
FL-
2-H5
FL+
2-H5
I178
I179
3808
I592
2808
3810
I596
2811
RL+
2-H5
RL-
2-I5
I181
I182
3811
I597
2812
3824
1K
AMPLI_TEMP
12-H12,12-M11
I618
PRF18
3829
3826
PTH9C32-470R
3825
22K
POWER AMP

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
2826	NOT USED	NOT USED	NOT USED	222291015649 100N
2827	NOT USED	NOT USED	NOT USED	222278015654 220n
2828	NOT USED	NOT USED	NOT USED	222278015654 220n
3820	NOT USED	NOT USED	NOT USED	232273081221 220R
3826	NOT USED	NOT USED	NOT USED	212066090036 PTH9C32-470R

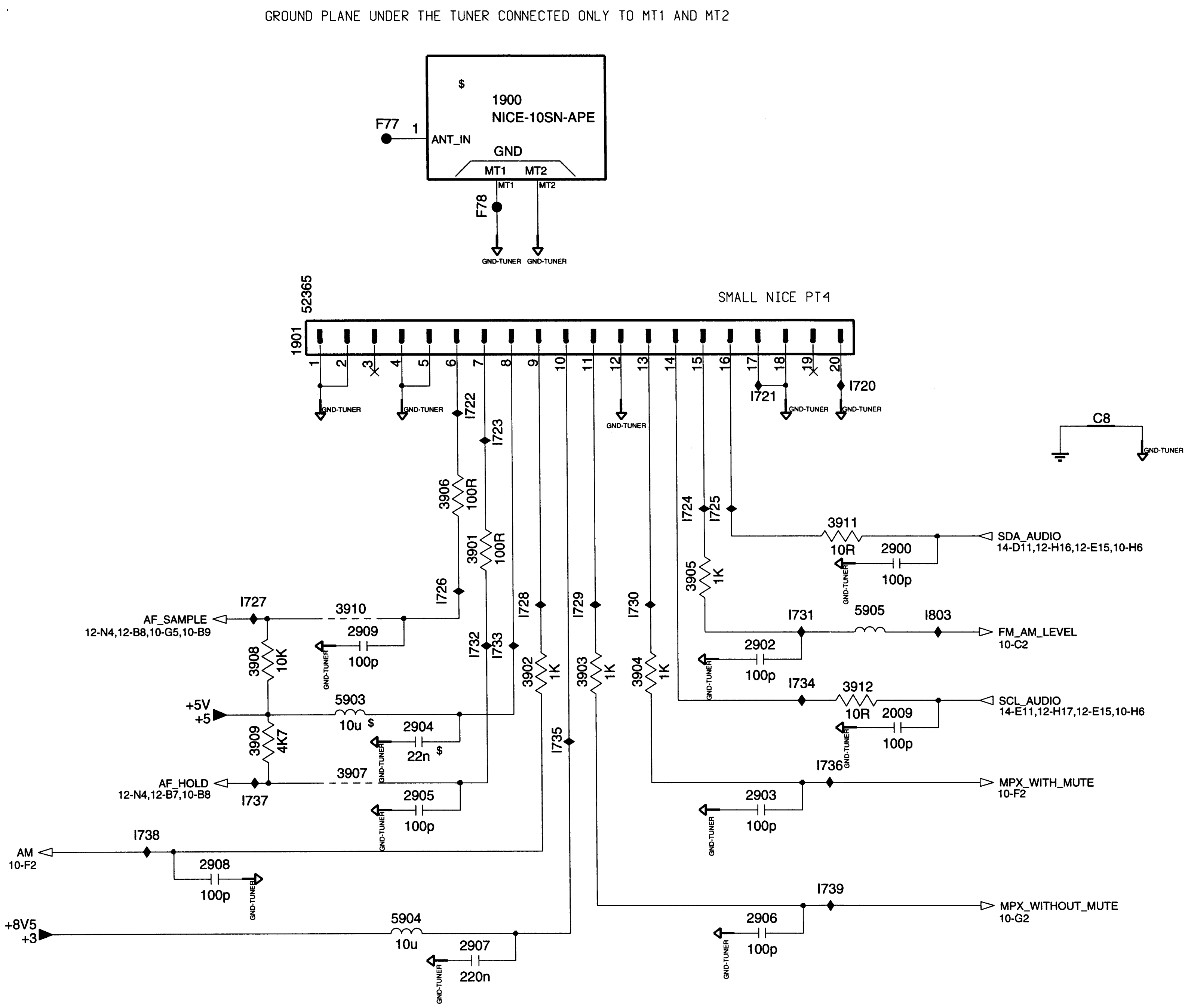
Mk4.5 Main PCB - Circuit 12



7850
C161CS-32RF
7858
AM29F800B
7853
M24C32
7854
PDTC124EU
7855
PDTC124EU
7856
PDTC124EU
+5V_NAVUS
+3V3_US
+5VF
NAV_ON
NAV_WAKE_UP
RESET_RR
SDA_EEP_OLIC
SCL_EEP_OLIC
SCL_ENG
SDA_ENG
SCL_FRONT
SDA_FRONT
SCL_AUDIO
SDA_AUDIO
SCL1
SDA1
PAUSE
FRONT_INT
PHONE_MUTE
ILLUM
FAN_DIAG
RC3
CHANGE_INFO
CD_INT
AMPLI_TEMP
POWER_SENSE
PCB_TEMP
READYN
RDS_DATA
RDS_CLK
V_LOW
PWEN
V_HIGH
TIMER_START
WATCH_TRIG
SET_ON
SW_MUTE
AF_HOLD
AF_SAMPLE
RST_CD
TxD2_RADIO
RxD2_RADIO
RESET_CDSP
ANTENNA_ON
SEL_FR
MUX_CD
RESET_FRONT
ILLUM_DECK
FAN_ON
EL_ON
CSN
RDN
WEN2
4M
CX-49G
1850
C161

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
3863	NOT USED	NOT USED	NOT USED	232270281563 56K
3898	NOT USED	NOT USED	NOT USED	232270281103 10K
3899	NOT USED	NOT USED	NOT USED	232270281563 56K

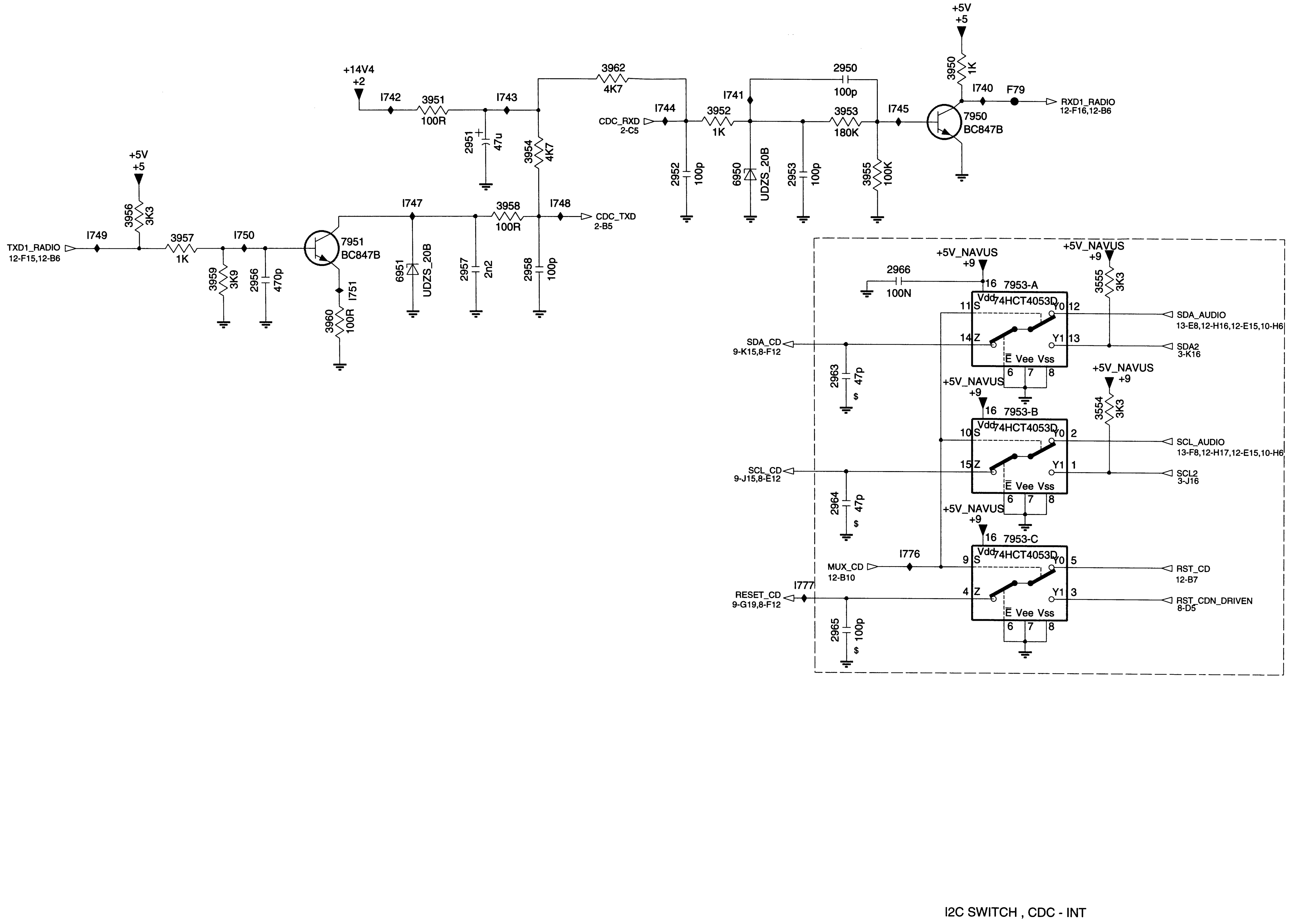
Mk4.5 Main PCB - Circuit 13


GROUND PLANE UNDER THE TUNER CONNECTED ONLY TO MT1 AND MT2
1900
NICE-10SN-APE
F77
ANT_IN
GND
MT1
MT2
F78
GND-TUNER
52365
1901
SMALL NICE PT4
I720
I721
I722
I723
I724
I725
I726
I727
I728
I729
I730
I731
I732
I733
I734
I735
I736
I737
I738
I739
I803
C8
3906 100R
3901 100R
3911 10R
2900 100p
SDA_AUDIO
14-D11,12-H16,12-E15,10-H6
3905 1K
5905
FM_AM_LEVEL
10-C2
2902 100p
3912 10R
2009 100p
SCL_AUDIO
14-E11,12-H17,12-E15,10-H6
AF_SAMPLE
12-N4,12-B8,10-G5,10-B9
3910
2909 100p
3908 10K
+5V
+5
5903 10u
2904 22n
3909 4K7
AF_HOLD
12-N4,12-B7,10-B8
3907
2905 100p
3902 1K
3903 1K
3904 1K
2903 100p
MPX_WITH_MUTE
10-F2
AM
10-F2
2908 100p
+8V5
+3
5904 10u
2907 220n
2906 100p
MPX_WITHOUT_MUTE
10-G2

	MS4200RSxx	MS4150RSxx	NAV-R45	MAX _ Partlist
Ref Des	A2C53059677	A2C53059680	A2C53059682	A2C53059686
2009	NOT USED	NOT USED	NOT USED	223886775101 100p
2900	NOT USED	NOT USED	NOT USED	223886775101 100p
2903	NOT USED	NOT USED	NOT USED	223886775101 100p
3904	NOT USED	NOT USED	NOT USED	232270281102 1K
3907	NOT USED	NOT USED	NOT USED	232270292002
3910	NOT USED	NOT USED	NOT USED	232270292002

TUNER

Mk4.5 Main PCB - Circuit 14


+14V4
+2
I742
3951
100R
I743
2951
47u
3962
4K7
3954
4K7
+5V
+5
3956
3K3
TXD1_RADIO
12-F15,12-B6
I749
3957
1K
I750
3959
3K9
2956
470p
7951
BC847B
I751
3960
100R
I747
6951
UDZS_20B
2957
2n2
3958
100R
I748
2958
100p
CDC_TXD
2-B5
CDC_RXD
2-C5
I744
2952
100p
3952
1K
I741
6950
UDZS_20B
2950
100p
3953
180K
2953
100p
I745
3955
100K
+5V
+5
3950
1K
I740
F79
RXD1_RADIO
12-F16,12-B6
7950
BC847B
+5V_NAVUS
+9
2966
100N
16
7953-A
Vdd
74HCT4053D
11 S
Y0 12
14 Z
Y1 13
E Vee Vss
6 7 8
+5V_NAVUS
+9
3555
3K3
SDA_AUDIO
13-E8,12-H16,12-E15,10-H6
SDA2
3-K16
SDA_CD
9-K15,8-F12
2963
47p
$
+5V_NAVUS
+9
16
7953-B
Vdd
74HCT4053D
10 S
Y0 2
15 Z
Y1 1
E Vee Vss
6 7 8
+5V_NAVUS
+9
3554
3K3
SCL_AUDIO
13-F8,12-H17,12-E15,10-H6
SCL2
3-J16
SCL_CD
9-J15,8-E12
2964
47p
$
+5V_NAVUS
+9
16
7953-C
Vdd
74HCT4053D
MUX_CD
12-B10
I776
9 S
Y0 5
RST_CD
12-B7
RESET_CD
9-G19,8-F12
I777
4 Z
Y1 3
RST_CDN_DRIVEN
8-D5
E Vee Vss
6 7 8
2965
100p
$
I2C SWITCH , CDC - INT

Mk4.5 Main PCB - Mapping 1

REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE	REFDES	SH-ZONE
1100	2-B3	2065	1-G19	2350	6-B3	2718	10-D2	2841	12-N11	3008	1-D6	3139	2-F7	3562	8-F7
1101	2-E18	2066	1-G18	2401	7-D6	2719	10-E3	2842	12-N11	3009	1-C7	3145	2-B5	3600	9-B6
1102	2-C9	2067	1-G18	2403	7-F6	2720	10-D10	2843	12-N11	3010	1-D9	3146	2-C5	3603	9-C7
1103	2-N18	2068	1-H16	2404	7-F7	2721	10-D11	2844	12-H12	3011	1-D5	3149	2-M11	3605	9-C5
1104	2-O3	2100	2-B13	2426	7-D9	2722	10-D10	2845	12-G12	3012	1-D10	3153	2-L14	3607	9-C4
1105	2-B10	2101	2-B16	2427	7-D7	2723	10-D11	2846	12-H17	3013	1-E7	3156	2-I6	3609	9-D4
1200	3-F13	2102	2-C16	2428	7-E10	2724	10-D10	2847	12-H16	3014	1-I8	3157	2-I7	3610	9-J16
1300	5-G3	2104	2-D14	2429	7-E6	2726	10-E10	2848	12-H16	3015	1-J2	3158	2-I7	3611	9-K16
1350	6-A4	2106	2-D13	2430	7-E8	2727	10-E11	2849	12-H15	3017	1-J4	3161	2-I6	3612	9-G16
1351	6-C8	2107	2-E15	2431	7-E8	2729	10-E4	2850	12-H2	3018	1-J4	3201	3-N12	3621	9-H9
1500	8-B2	2109	2-E13	2500	8-A7	2730	10-E4	2851	12-H3	3020	1-J2	3202	3-M12	3622	9-M13
1501	8-F11	2110	2-F14	2501	8-B5	2731	10-E10	2852	12-H3	3021	1-I15	3203	3-C14	3623	9-M11
1510	8-B1	2112	2-H15	2503	8-C2	2732	10-F10	2853	12-I2	3022	1-J15	3205	3-B14	3624	9-H11
1599	8-B3	2113	2-I15	2504	8-C4	2733	10-F2	2854	12-I3	3023	1-L3	3206	3-I14	3625	9-M13
1602	9-E19	2114	2-J15	2505	8-C4	2734	10-F11	2856	12-J2	3024	1-L3	3207	3-I14	3628	9-I10
1603	9-H11	2117	2-O7	2506	8-A4	2735	10-F12	2857	12-J3	3025	1-L3	3208	3-C19	3629	9-I10
1604	9-J9	2118	2-L14	2507	8-B6	2736	10-F12	2858	12-J3	3026	1-J14	3209	3-D19	3631	9-K9
1700	10-G6	2119	2-N11	2508	8-E11	2738	10-F2	2859	12-K2	3027	1-M5	3210	3-H14	3636	9-K9
1850	12-L7	2120	2-M3	2509	8-F11	2739	10-F11	2860	12-K3	3028	1-M7	3211	3-H14	3639	9-K8
1900	13-B4	2121	2-N17	2512	8-E2	2740	10-F3	2861	12-M8	3029	1-K18	3212	3-D19	3643	9-J4
1901	13-D5	2129	2-C6	2513	8-E4	2741	10-G3	2862	12-M1	3030	1-I10	3213	3-G11	3645	9-D16
2000	1-B3	2130	2-E6	2515	8-H9	2742	10-G11	2864	12-L2	3031	1-G2	3214	3-G11	3650	9-D16
2001	1-B4	2131	2-F6	2516	8-G5	2743	10-G3	2865	12-K8	3033	1-J10	3215	3-E11	3700	10-A4
2002	1-C7	2132	2-I7	2517	8-H7	2744	10-G3	2866	12-M2	3034	1-M15	3216	3-I9	3701	10-A3
2003	1-C7	2133	2-J6	2518	8-G3	2745	10-G12	2868	12-M6	3035	1-M8	3217	3-K10	3702	10-F5
2004	1-I16	2200	3-E1	2520	8-H5	2748	10-H5	2869	12-M7	3036	1-N15	3218	3-K9	3703	10-B6
2005	1-N9	2202	3-E1	2521	8-J5	2749	10-H6	2871	12-N2	3037	1-N14	3220	3-F13	3704	10-C2
2006	1-C7	2203	3-E2	2522	8-H3	2750	10-H6	2873	12-N3	3038	1-D4	3221	3-F13	3705	10-B5
2007	1-E9	2204	3-E2	2524	8-H2	2753	10-H7	2874	12-N3	3039	1-D4	3223	3-M10	3706	10-B10
2008	1-J2	2205	3-E2	2600	9-B6	2759	10-H12	2875	12-N3	3040	1-C10	3225	3-M9	3707	10-B11
2009	13-F7	2206	3-E2	2601	9-C7	2760	10-B5	2876	12-N4	3041	1-D6	3226	3-K14	3708	10-C3
2012	1-E5	2207	3-E3	2602	9-D4	2761	10-G9	2877	12-N4	3044	1-D11	3228	3-N3	3709	10-B8
2013	1-E9	2208	3-E3	2604	9-I16	2762	10-B2	2878	12-N4	3045	1-N9	3250	4-L11	3710	10-B9
2014	1-K4	2209	3-F1	2605	9-I16	2763	10-F12	2879	12-N5	3046	1-H4	3251	4-H19	3711	10-B12
2015	1-E13	2210	3-F1	2606	9-J16	2764	10-B12	2885	12-G14	3047	1-E5	3254	3-M14	3712	10-B10
2016	1-E14	2211	3-F2	2607	9-K16	2765	10-F3	2887	12-N9	3049	1-F2	3351	6-G3	3713	10-B8
2017	1-F13	2212	3-F2	2608	9-G3	2767	10-F2	2888	12-N9	3050	1-F16	3403	7-C3	3714	10-C12
2019	1-J9	2213	3-F2	2609	9-H3	2801	11-B2	2889	12-N10	3051	1-G16	3404	7-C3	3715	10-D3
2020	1-H14	2214	3-F2	2610	9-I3	2802	11-F10	2890	12-N10	3052	1-G19	3405	7-C3	3716	10-D3
2021	1-H15	2215	3-F3	2613	9-K8	2803	11-F10	2891	12-N12	3053	1-H19	3406	7-C4	3717	10-C10
2022	1-I10	2216	3-F3	2614	9-K9	2804	11-F10	2894	12-G15	3054	1-K16	3407	7-E3	3718	10-D10
2023	1-I11	2217	3-C19	2615	9-H8	2805	11-F10	2895	12-G16	3055	1-K16	3410	7-F3	3719	10-D10
2024	1-I12	2218	3-D19	2616	9-I11	2806	11-G10	2896	12-G16	3060	1-J12	3486	7-D9	3721	10-E10
2025	1-I12	2219	3-D19	2617	9-M11	2807	11-D3	2897	12-G17	3061	1-K11	3487	7-D10	3723	10-E3
2026	1-I18	2221	3-H15	2618	9-M12	2808	11-G10	2898	12-G17	3100	2-B16	3488	7-D7	3724	10-F2
2027	1-I16	2222	3-I15	2619	9-M4	2809	11-D6	2899	12-H15	3101	2-D12	3489	7-D7	3725	10-G5
2028	1-J14	2223	3-N13	2621	9-N3	2810	11-D7	2900	13-E7	3102	2-C16	3500	8-A8	3726	10-G6
2029	1-J14	2226	3-N3	2622	9-N3	2811	11-G10	2902	13-F6	3103	2-C15	3501	8-B8	3727	9-F6
2030	1-M7	2227	3-G10	2624	9-N11	2812	11-G10	2903	13-G6	3104	2-C14	3503	8-B5	3728	10-F2
2033	1-K18	2228	3-L9	2625	9-N4	2813	11-E9	2904	13-F4	3105	2-C7	3514	8-D3	3729	10-F11
2035	1-L14	2229	3-E14	2626	9-N6	2814	11-E6	2905	13-G4	3106	2-D12	3515	8-D4	3730	10-G5
2036	1-L15	2230	3-E13	2627	9-N6	2815	11-E4	2906	13-G6	3107	2-C6	3521	8-E3	3731	10-G6
2039	1-M12	2232	3-M9	2628	9-L6	2816	11-E5	2907	13-H5	3108	2-E12	3527	8-I3	3732	9-H6
2040	1-M12	2234	3-J9	2630	9-J3	2817	11-F4	2908	13-G3	3109	2-E14	3528	8-H4	3735	9-I6
2041	1-M17	2300	5-I18	2632	9-D16	2818	11-F5	2909	13-F4	3110	2-E12	3530	8-G7	3736	10-G2
2042	1-M16	2301	5-I18	2633	9-E16	2821	11-G4	2950	14-B9	3111	2-F14	3531	8-G8	3737	10-G11
2043	1-M14	2304	5-I18	2634	9-E16	2822	11-G5	2951	14-C6	3112	2-G14	3532	8-H4	3738	10-H6
2044	1-N14	2305	5-H14	2635	9-F16	2823	11-G4	2952	14-C7	3113	2-H15	3533	8-H6	3739	10-G3
2045	1-C9	2308	5-I14	2636	9-G16	2824	11-G5	2953	14-C8	3114	2-I15	3534	8-F7	3740	10-G12
2046	1-B4	2309	5-I14	2700	10-A2	2825	11-H6	2956	14-D4	3116	2-N7	3535	8-H6	3741	10-H12
2047	1-N6	2311	5-E8	2701	10-B10	2826	11-H6	2957	14-D6	3123	2-L5	3536	8-I4	3749	10-E3
2054	1-C10	2312	5-E9	2702	10-B7	2827	11-H6	2958	14-D6	3124	2-M3	3537	8-J4	3750	10-G4
2055	1-M10	2313	5-H18	2703	10-B7	2828	11-H7	2963	14-E9	3125	2-M4	3538	8-I6	3751	10-B3
2057	1-M16	2314	5-C18	2707	10-C3	2829	11-E4	2964	14-F9	3126	2-M4	3541	8-I2	3753	10-F3
2058	1-E14	2315	5-C18	2708	10-I8	2830	11-F4	2965	14-G9	3127	2-G13	3542	8-H2	3754	10-F4
2059	1-D15	2316	5-B18	2710	10-B6	2831	11-F4	2966	14-D9	3131	2-O4	3543	8-I1	3756	10-A3
2060	1-D16	2317	5-B18	2713	10-B12	2832	11-G4	3001	1-C10	3132	2-O4	3544	8-I3	3757	10-E3
2061	1-D16	2318	5-C14	2714	10-C4	2833	12-H12	3002	1-D10	3134	2-K13	3547	8-H2	3758	10-F3
2062	1-D17	2319	5-B14	2715	10-C10	2834	12-A16	3005	1-F6	3136	2-L13	3554	14-E11	3759	10-D4
2063	1-F15	2320	5-B14	2716	10-C11	2839	12-G14	3006	1-M10	3137	2-L12	3555	14-D11	3800	11-A3
2064	1-G18	2330	6-A3	2717	10-C11	2840	12-N12	3007	1-M9	3138	2-E7	3560	8-G1	3801	11-B2

MAPPING 1

Mk4.5 Main PCB - Mapping 2

REFDES	SH-ZONE
3802	11-B2
3803	11-F9
3804	11-F9
3805	11-F9
3806	11-F9
3807	11-G9
3808	11-G9
3809	11-D7
3810	11-G9
3811	11-G9
3812	11-E6
3813	11-E6
3814	11-E4
3817	11-F4
3818	11-G4
3819	11-G4
3820	11-G7
3823	11-H8
3824	11-I7
3825	11-J7
3826	11-J7
3827	11-B2
3828	11-A4
3829	11-J6
3850	12-B4
3851	12-C12
3852	12-C12
3853	12-C13
3854	12-C13
3855	12-C13
3856	12-C13
3857	12-D14
3858	12-D14
3860	12-E15
3862	12-F15
3863	12-K12
3864	12-G13
3865	12-K6
3867	12-L9
3868	12-L9
3869	12-L9
3870	12-L9
3871	12-L10
3872	12-L5
3873	12-L6
3874	12-L7
3875	12-B15
3876	12-B16
3877	12-B17
3878	12-M7
3879	12-N7
3880	12-B6
3881	12-E2
3882	12-D3
3883	12-B3
3884	12-B11
3890	12-L10
3891	12-L10
3892	12-L10
3893	12-L10
3894	12-L11
3895	12-L11
3896	12-L11
3897	12-L11
3898	12-L6
3899	12-K12
3900	12-K15
3901	13-E5
3902	13-F5
3903	13-F5
3904	13-F6

REFDES	SH-ZONE
3905	13-E6
3906	13-E4
3907	13-F4
3908	13-F3
3909	13-F3
3910	13-E4
3911	13-E7
3912	13-F7
3913	12-L16
3915	12-M16
3950	14-B9
3951	14-B5
3952	14-B8
3953	14-B9
3954	14-C6
3955	14-C9
3956	14-C3
3957	14-D3
3958	14-C6
3959	14-D4
3960	14-D5
3962	14-B7
4101	2-G17
4510	8-H6
5000	1-B3
5001	1-H11
5002	1-H12
5003	1-H15
5004	1-I15
5005	1-I17
5006	1-L12
5007	1-L15
5008	1-M15
5009	1-M17
5010	1-F15
5011	1-G18
5012	1-G19
5300	6-A3
5400	7-F6
5500	8-E11
5501	8-F11
5600	9-K5
5601	9-K10
5604	9-E16
5700	10-A10
5701	10-B8
5850	12-L2
5851	12-G13
5903	13-F4
5904	13-G4
5905	13-E7
6000	1-D4
6002	1-B5
6004	1-I5
6005	1-I5
6006	1-H15
6007	1-N7
6008	1-N5
6009	1-K15
6016	1-N14
6017	1-J14
6100	2-B15
6101	2-D15
6102	2-D12
6103	2-E12
6104	2-F14
6105	2-H14
6106	2-I14
6107	2-L7
6108	2-J14
6109	2-M7

REFDES	SH-ZONE
6111	2-L3
6112	2-C7
6113	2-L14
6115	2-I7
6201	3-N12
6300	3-M15
6301	3-N15
6500	8-H3
6501	8-G1
6509	8-G3
6601	9-C4
6612	9-M12
6613	9-M13
6614	9-D5
6803	11-C3
6804	11-C3
6851	12-B5
6852	12-B6
6950	14-C8
6951	14-D5
6958	1-B7
6961	1-B3
6962	1-G17
7001	1-F6
7002	1-C11
7003	1-D8
7004	1-D6
7005	1-D13
7006	1-M10
7007	1-F12
7008	1-K6
7009	1-I13
7010	1-K17
7012	1-M13
7013	1-J10
7014	1-D16
7015	1-G17
7016	1-G16
7017	1-J12
7018	1-J12
7101-A	8-H3
7101-B	8-H5
7103	2-H13
7104	2-N7
7105	2-L14
7107	2-M12
7108	2-M4
7109	2-K13
7111	2-B14
7112	2-C15
7203	3-G9
7207	3-L9
7250-A	4-?10
7250-B	4-K2
7250-C	4-K15
7250-D	4-K10
7250-E	3-J17
7250-F	3-F4
7250-G	3-L4
7250-H	3-J12
7252	3-M10
7304	5-E16
7305	5-L16
7306	5-F8
7404	7-D5
7420-A	7-D8
7420-B	7-D10
7500-A	8-D3
7500-B	8-H7
7500-C	9-C6
7500-D	11-B3

REFDES	SH-ZONE
7502	8-B6
7503	8-C3
7600-A	9-F4
7600-B	9-F5
7600-C	9-H4
7600-D	9-H5
7600-E	9-I4
7600-F	9-I5
7606	9-H10
7607	9-H10
7608	9-M9
7609	9-M5
7612	9-K7
7700	10-C10
7701	10-C11
7702	10-E7
7802	11-C5
7803	11-F8
7850	12-G8
7853	12-B16
7854	12-C2
7855	12-E3
7856	12-F3
7858	12-J14
7950	14-B9
7951	14-D4
7953-A	14-D10
7953-B	14-E10
7953-C	14-F10

REFDES	SH-ZONE
C1	2-C5
c5	10-G9
C6	10-G9
C7	10-H7
C8	13-D8

REFDES	SH-ZONE
F2	1-D14
F3	1-D9
F4	1-C10
F5	1-I4
F6	1-L4
F7	1-L4
F8	1-N6
F9	2-B17
F10	2-B4
F11	2-B4
F12	2-C4
F13	2-C4
F14	2-C4
F15	2-C4
F16	2-C4
F17	2-D4
F18	2-D4
F19	2-D4
F20	2-D4
F21	1-D10
F22	2-E4
F23	2-E4
F24	2-E4
F25	2-E4
F26	2-E4
F27	1-K3
F28	1-K18
F30	2-F15
F32	2-G4

REFDES	SH-ZONE
F33	2-G4
F34	2-G4
F35	2-G15
F36	2-H4
F37	2-H4
F38	2-H4
F39	2-I4
F40	2-G4
F41	2-H15
F42	2-G4
F43	2-H4
F44	2-H4
F45	2-I4
F46	2-I4
F47	2-I15
F48	2-I4
F49	2-I4
F50	2-I8
F51	2-O3
F52	2-O3
F54	2-J4
F55	2-L16
F56	12-K6
F57	12-G12
F58	12-M6
F59	6-A3
F60	6-B3
F61	6-B3
F62	6-B3
F63	6-C3
F64	6-C3
F65	8-C4
F66	8-B5
F67	8-H8
F68	10-C12
F69	10-D11
F70	10-E11
F71	10-E11
F72	12-B8
F73	12-B8
F74	12-F2
F75	12-K5
F76	12-K9
F77	13-B4
F78	13-C5
F79	14-B10
F80	10-G6
F81	10-G7
F82	6-C3
F83	9-J9
F84	9-J10
F85	9-M4
F86	9-M4
F87	9-H11
F88	10-H6
F89	1-M10
F90	1-I17
F91	1-F2
F92	2-C16
F94	11-H8
F95	1-I10
F96	1-I16
F97	10-D2
F98	3-J10
F100	1-G19
F101	1-D17
F102	1-M20
F300	3-G13
F301	3-G13
F600	6-G3

REFDES	SH-ZONE
I1	1-B4
I2	1-B6
I3	1-G18
I4	1-F16
I5	1-D10
I6	1-F17
I7	1-G18
I8	1-C10
I9	1-C7
I10	1-C13
I11	1-D7
I12	1-C5
I13	1-D9
I15	3-E13
I16	3-F13
I17	1-D6
I18	1-D7
I19	1-D9
I20	1-D5
I21	1-D5
I22	3-K14
I23	1-D4
I24	3-G10
I25	3-H11
I26	1-D13
I27	1-D14
I28	1-D9
I29	3-I14
I30	1-F11
I31	3-I14
I32	6-D2
I33	1-C9
I34	1-H14
I35	1-H15
I36	1-H14
I37	1-H15
I38	1-H11
I39	1-H12
I40	1-H12
I41	3-K10
I42	3-M10
I43	3-M12
I44	1-I18
I45	1-I13
I46	1-I14
I47	1-J3
I48	1-I14
I49	1-I14
I50	1-I9
I51	1-J3
I52	3-N3
I53	1-J18
I54	1-J14
I55	1-J4
I56	3-M14
I57	1-J4
I58	1-I10
I59	1-J9
I60	1-K4
I61	1-E5
I62	1-K8
I63	1-K3
I64	7-D10
I65	1-K8
I66	1-K18
I67	3-M15
I68	1-D6
I69	1-K14
I70	1-K15
I71	1-M9
I72	1-M9

REFDES	SH-ZONE
I73	1-L8
I74	1-L8
I75	1-L18
I76	1-L14
I77	1-L12
I78	1-L12
I79	1-L5
I80	1-L7
I81	1-M15
I82	1-M19
I83	1-M5
I84	1-M7
I85	1-M14
I86	1-M14
I87	1-M14
I88	1-M13
I89	1-M6
I90	1-M5
I91	1-N5
I92	1-N14
I93	2-B17
I94	1-F6
I95	2-C15
I96	8-H8
I97	2-C17
I98	2-C6
I99	2-C5
I100	2-C14
I101	2-G17
I103	2-F8
I104	1-E10
I105	2-D13
I106	2-I4
I107	7-D6
I108	2-E13
I109	2-F14
I110	2-F14
I111	8-G7
I112	8-H7
I113	1-J12
I114	1-J11
I115	2-H12
I116	2-H13
I117	8-D4
I118	8-H6
I119	8-I5
I120	8-H5
I121	2-C4
I122	2-M7
I123	1-G20
I124	2-M7
I125	2-E6
I126	2-N7
I127	2-L7
I128	2-L14
I129	2-N7
I130	2-K14
I131	12-G14
I132	2-D13
I133	2-L15
I134	2-E13
I135	2-M12
I136	2-L14
I137	2-M11
I138	2-M12
I139	3-F11
I141	2-M5
I142	2-L3
I143	2-N17
I144	2-M4
I145	8-H4

REFDES	SH-ZONE
I146	8-H3
I147	8-H3
I148	8-I3
I149	8-G1
I150	8-H1
I151	8-H2
I152	8-H2
I153	2-H15
I154	2-I15
I155	2-I6
I156	3-G10
I157	3-I9
I158	3-L9
I159	3-M10
I160	3-C18
I161	3-D18
I162	3-D18
I163	8-E11
I164	8-F11
I165	9-F3
I166	9-K7
I167	9-F16
I168	9-G16
I169	10-E10
I170	3-H16
I171	3-I16
I172	10-B2
I173	10-F2
I174	11-F9
I175	11-F9
I176	11-F9
I177	3-M12
I178	11-G9
I179	11-G9
I180	11-F9
I181	11-G9
I182	11-G9
I183	11-G5
I184	11-F5
I185	12-M9
I186	12-M15
I187	12-K15
I188	12-J15
I189	1-J3
I190	2-C9
I191	6-C2
I192	8-F11
I193	8-G11
I202	12-C3
I203	12-C6
I204	12-B11
I205	12-C11
I206	12-F12
I207	12-F12
I208	12-L13
I210	3-B15
I211	3-B15
I212	3-B14
I213	3-C14
I214	3-C15
I215	3-F13
I216	3-J15
I217	3-J15
I218	3-J15
I219	3-K15
I241	4-M11
I243	4-M11
I244	4-N11
I246	4-N11
I247	4-L10
I249	1-B6

MAPPING 2

Mk4.5 Main PCB - Mapping 3

REFDES	SH-ZONE
I250	7-D3
I251	1-G16
I252	1-G18
I253	6-H4
I254	6-C2
I255	6-D7
I256	6-H2
I257	7-C3
I258	1-G17
I259	7-D3
I260	7-D4
I261	7-D7
I262	7-D3
I264	7-D3
I265	7-D6
I266	7-D9
I267	7-D6
I268	7-D8
I269	7-D7
I272	7-E3
I273	7-E4
I275	7-F6
I276	7-F3
I326	10-E12
I368	8-B5
I371	8-B7
I372	8-H9
I373	8-B7
I374	8-C4
I376	8-B7
I382	8-D2
I383	8-D3
I388	8-H11
I389	8-H11
I391	8-H11
I392	8-H11
I398	8-F11
I404	8-F11
I406	8-E11
I411	8-E11
I420	9-B6
I422	9-K7
I424	9-C7
I427	9-C4
I428	9-C5
I429	9-H18
I430	9-H17
I431	9-I17
I432	9-J17
I433	9-K17
I435	9-G15
I438	8-G11
I439	9-F5
I440	9-F6
I442	9-D17
I443	9-D17
I444	9-D17
I445	9-E16
I448	9-H5
I449	9-H6
I450	9-H6
I453	9-F16
I455	9-G16
I456	9-I5
I457	9-I6
I458	9-J9
I459	12-B16
I461	9-K9
I462	9-K10
I463	9-K8
I465	9-L11
I466	9-L6
I467	9-H11
I469	9-H9
I470	9-M12
I471	9-M12
I472	9-M3
I475	9-M6
I476	9-M3
I479	9-M6
I480	9-H10
I481	9-H11
I482	9-H10
I483	9-M11
I484	9-M12
I485	9-M4
I486	9-N6
I487	9-N4
I488	9-N6
I489	9-N4
I490	9-N4
I491	10-A3
I492	10-A2
I493	10-H9
I494	10-B8
I497	10-B11
I498	10-B5
I499	10-B5
I500	10-B3
I501	10-B3
I502	10-C7
I503	10-B10
I504	10-A3
I505	10-B11
I506	10-E3
I507	10-C11
I508	10-C8
I509	10-B9
I510	10-C9
I511	10-C6
I512	10-C8
I513	10-C8
I514	10-C5
I515	10-C8
I516	10-C8
I517	10-C9
I518	10-C10
I519	10-C3
I520	10-C10
I521	10-C10
I522	10-C10
I523	10-C12
I524	10-D9
I525	10-D10
I526	10-D9
I527	10-D12
I528	10-D10
I529	10-D2
I531	10-D4
I532	10-D9
I533	10-E10
I534	10-E3
I536	10-E9
I537	10-E4
I538	10-E4
I539	10-E10
I541	10-F3
I542	10-E12
I543	10-E4
I544	10-F2
I545	10-F4
I546	10-F4
I547	10-F3
I548	10-F4
I549	10-F4
I550	10-F2
I551	10-F3
I552	10-F4
I553	10-F12
I554	10-G5
I555	10-G5
I556	10-G6
I557	10-G6
I561	10-G9
I563	10-G6
I564	10-G5
I565	10-G12
I566	10-G6
I567	10-G3
I568	10-G4
I570	10-G6
I571	10-G9
I572	10-G6
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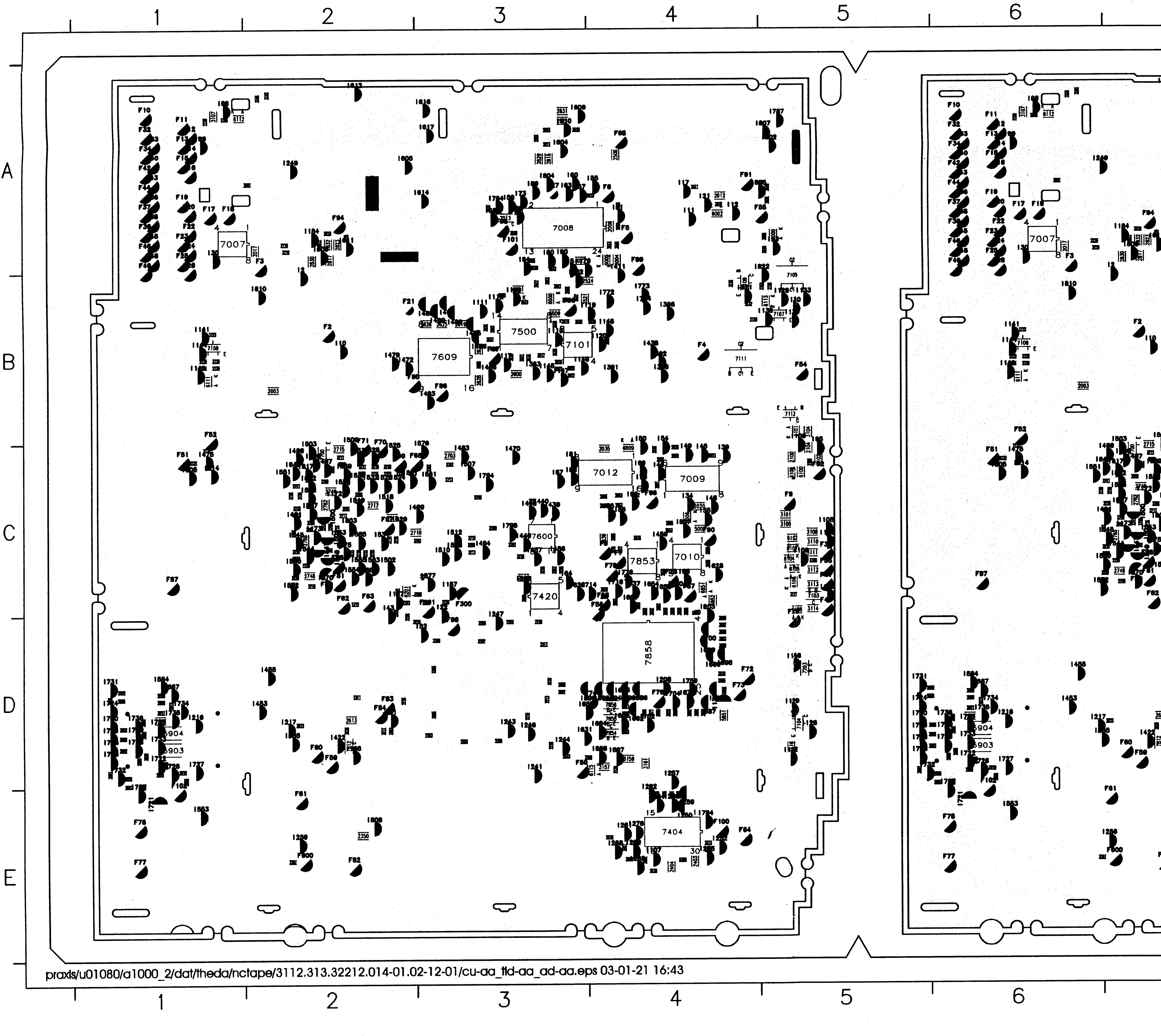
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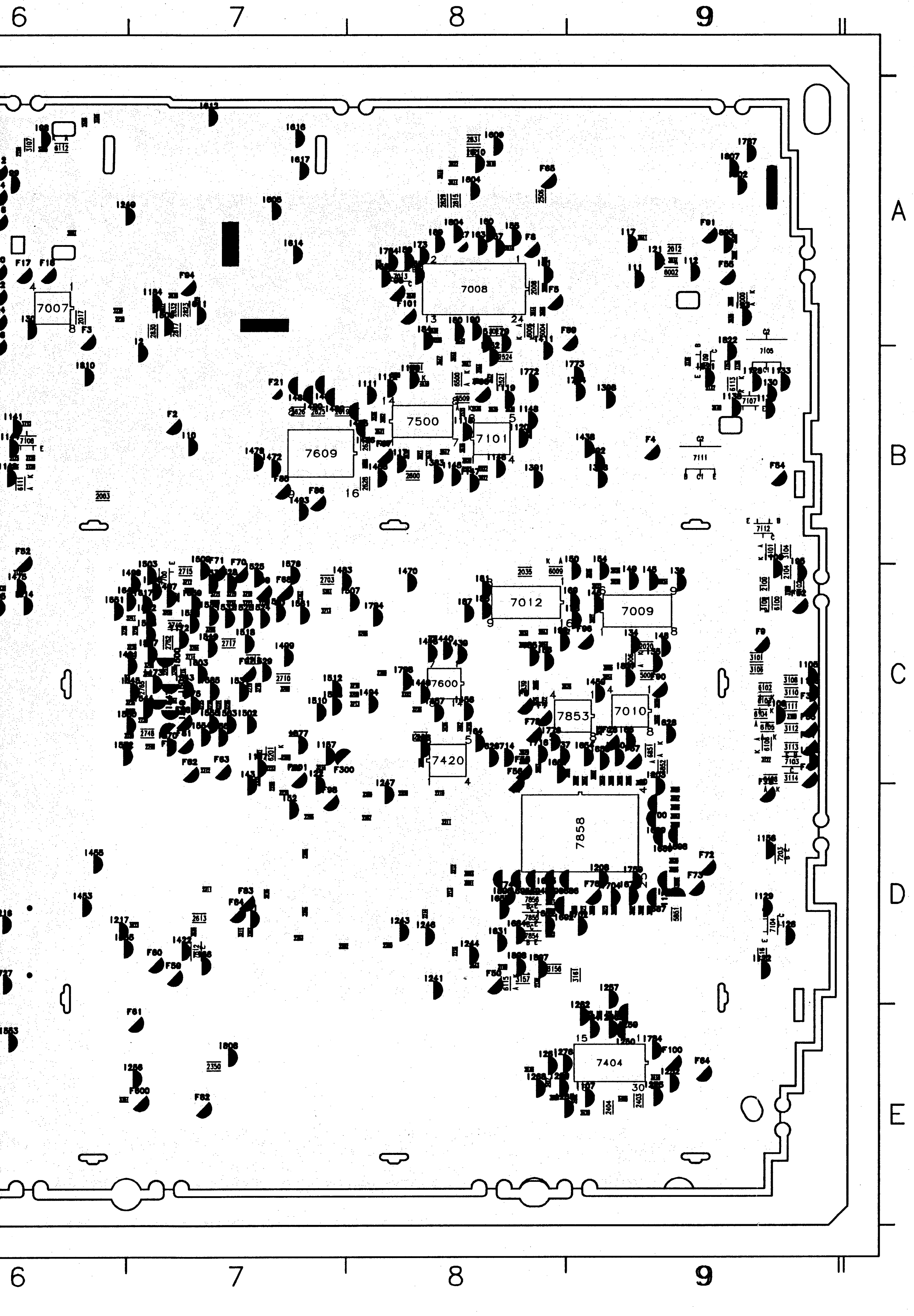

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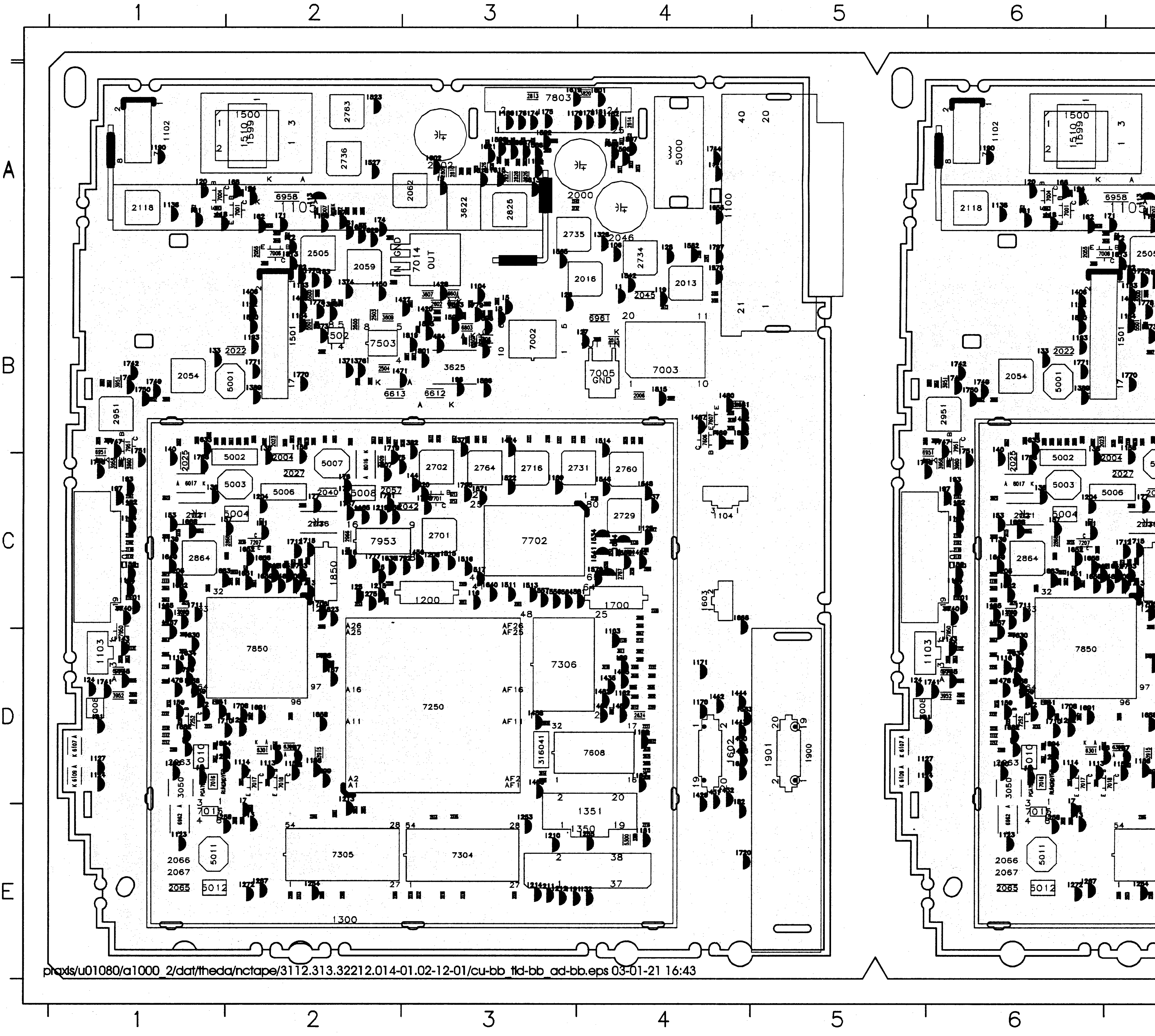
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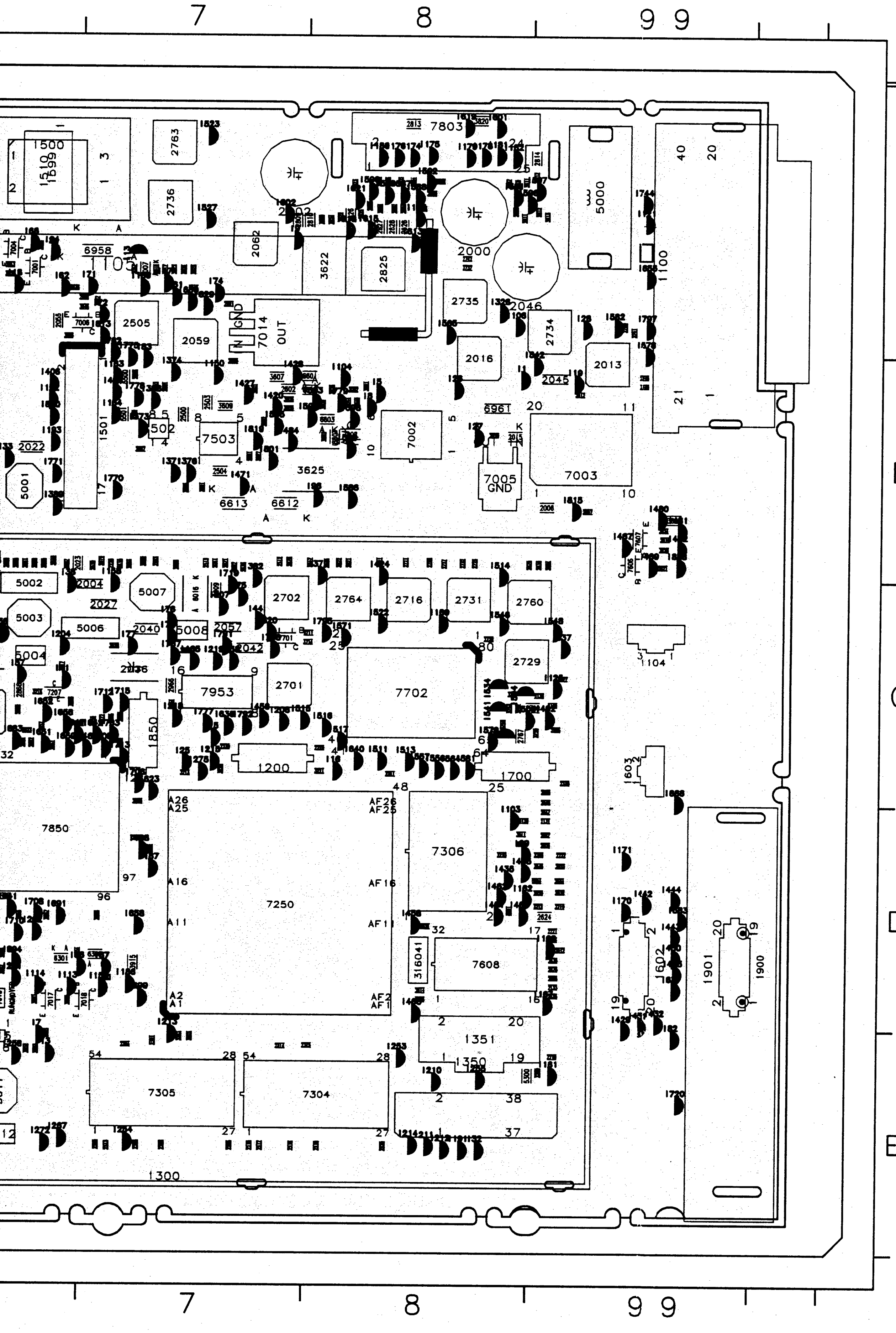

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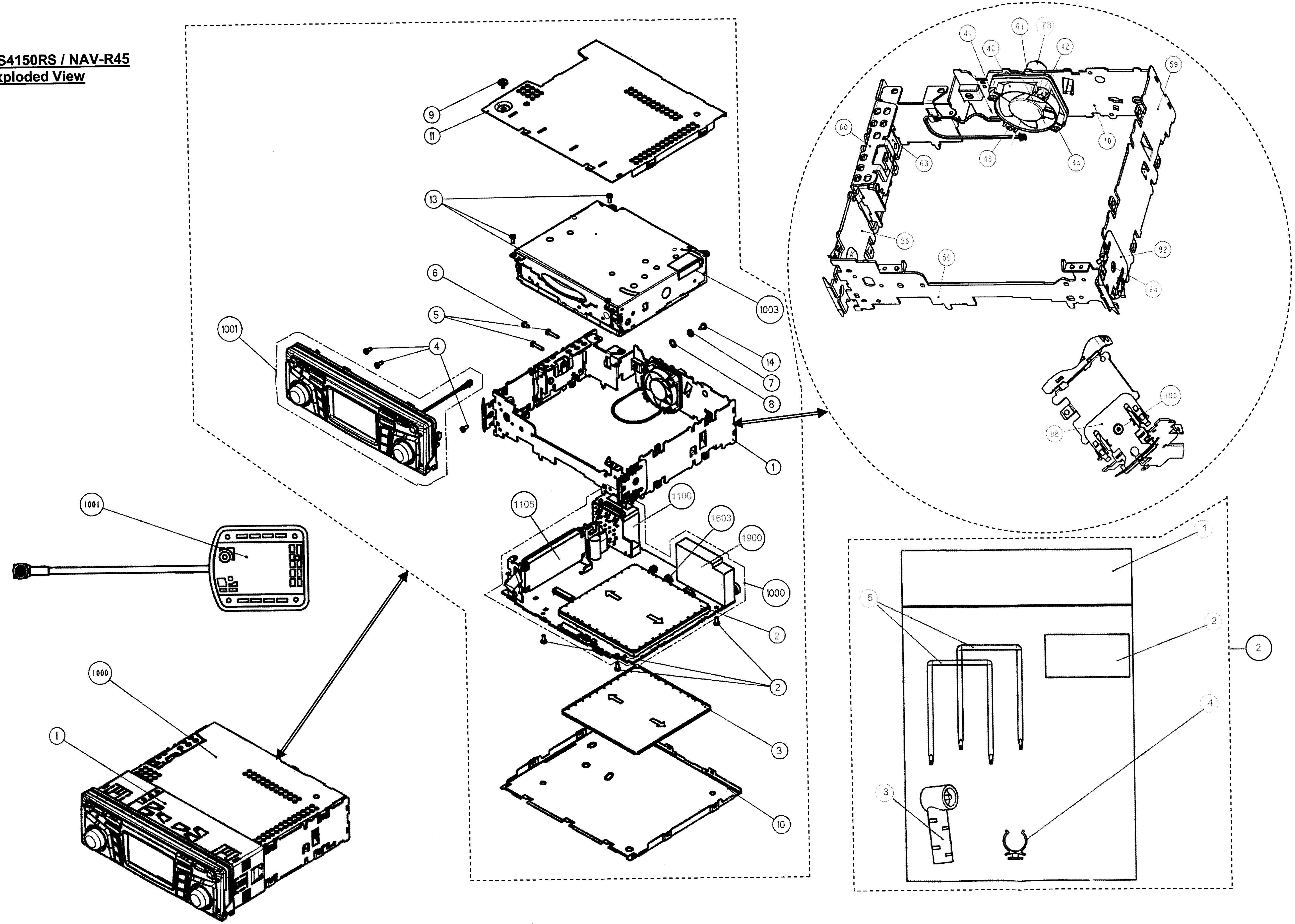
1350	E8	2501	B7	2862	B6	3622	A8	6804	B8	113	A7	1202	D6	1591	A8		
1351	E8	2503	B7	2864	C6	3624	B9	6950	D6	115	C7	1204	C6	1592	A8		
1500	A6	2504	B7	2865	C6	3625	B8	6951	B6	116	C8	1205	C6	1593	B8		
1501	B7	2505	A7	2866	C6	3628	B9	6958	A7	118	A6	1206	C7	1594	B8		
1510	A6	2507	B7	2868	C7	3629	B9	6961	B8	119	B9	1207	C7	1595	B7		
1599	A6	2508	B7	2869	C7	3631	D8	6962	E6	120	A6	1210	E8	1596	A8		
1602	D9	2509	B7	2871	B7	3636	D8	7001	A6	124	D5	1211	E8	1597	A9		
1603	C9	2512	B7	2873	C6	3645	D9	7002	B8	125	C7	1212	E8	1598	B8		
1604	D8	2513	B7	2874	C6	3650	D9	7003	B9	126	B8	1213	E7	1599	B8		
1700	C8	2515	B8	2875	C6	3711	C8	7004	A6	127	B8	1214	E8	1601	A8		
1850	C7	2601	B8	2876	D9	3714	C8	7005	B8	128	A9	1215	C7	1602	A7		
1900	D9	2602	B7	2877	C9	3737	A8	7006	A6	129	D8	1218	C7	1613	A8		
1901	D9	2604	D9	2878	B7	3740	B9	7014	A7	132	E8	1219	C7	1615	A8		
2000	A8	2605	D9	2879	B8	3741	A9	7015	E6	133	B6	1251	D6	1618	A8		
2002	A7	2606	D9	2887	C6	3753	C8	7016	D6	136	C6	1253	E8	1619	A8		
2004	C7	2607	D9	2888	B6	3756	C8	7017	D6	137	C6	1254	E7	1621	A8		
2005	A7	2608	B7	2889	B6	3757	C8	7018	D7	138	C6	1255	E8	1623	C7		
2006	B9	2609	B7	2890	B6	3758	C8	7207	C6	140	C6	1258	E6	1629	A7		
2007	B9	2610	B7	2891	B9	3759	C9	7250	D7	141	C6	1267	E6	1630	D6		
2013	B9	2614	D8	2894	D6	3800	B8	7252	D6	142	D6	1272	E6	1633	B6		
2014	A7	2615	B9	2895	D6	3801	B7	7304	E8	144	C7	1275	C7	1634	D6		
2015	B8	2616	B9	2896	C9	3802	B7	7305	E7	147	A7	1326	A8	1636	C7		
2016	B8	2617	B8	2897	B6	3803	A8	7306	D8	153	C6	1368	B7	1637	D9		
2019	B7	2618	B7	2898	B6	3804	A8	7502	B7	156	D6	1371	B7	1638	D6		
2021	C6	2621	B8	2899	B6	3805	A8	7503	B7	161	A6	1372	B8	1639	D6		
2022	B6	2622	B8	2950	D6	3806	A8	7606	B9	162	A6	1373	B7	1640	C8		
2023	B6	2624	D9	2951	B6	3807	A8	7607	B9	167	D7	1374	B7	1641	D6		
2025	C6	2630	B7	2952	D6	3808	A8	7608	D8	168	A6	1376	B7	1642	C7		
2026	C6	2632	D9	2953	D6	3809	A8	7701	C7	170	C7	1382	B7	1646	C7		
2027	C7	2633	D9	2956	B5	3810	A8	7702	C8	171	A7	1389	B6	1647	C6		
2036	C7	2634	D9	2957	C5	3811	A8	7802	B8	172	A7	1404	B7	1649	C6		
2039	C7	2635	D9	2958	C6	3812	A9	7803	A8	174	A7	1406	B6	1650	A7		
2040	C7	2636	D9	2963	B7	3813	A9	7850	D6	175	C7	1420	B7	1651	C6		
2041	B7	2700	C9	2964	B7	3820	A8	7950	D6	176	C7	1424	B8	1652	C6		
2042	C7	2701	C7	2965	C9	3823	A8	7951	B6	177	C7	1427	B7	1655	A9		
2045	B9	2702	C7	2966	C7	3824	A8	7953	C7	182	E9	1428	B7	1656	C6		
2046	A8	2708	B8	3001	B8	3825	A8			183	B7	1429	E9	1658	D7		
2047	A7	2716	C8	3002	B8	3826	A8			191	D5	1430	D9	1659	C6		
2054	B6	2721	B8	3005	A6	3827	B7			193	C6	1431	D9	1662	C6		
2055	A6	2723	B8	3006	A6	3828	B8			194	A6	1432	D9	1666	C9		
2057	C7	2727	B8	3007	A7	3829	A8			196	B8	1433	D9	1668	C6		
2058	B8	2729	C8	3008	A6	3857	C6			197	C6	1435	D8	1682	D6		
2059	A7	2730	C8	3009	A6	3858	C6			1101	C6	1442	D9	1683	C6		
2060	B7	2731	C8	3010	A7	3864	C6			1103	D8	1443	D9	1691	D6		
2061	A7	2732	B8	3012	B9	3865	C7			1104	B8	1444	D9	1703	C7		
2062	A7	2734	A9	3013	A6	3872	C7			1106	A8	1445	D8	1705	C7		
2063	D6	2735	A8	3017	A7	3874	C6			1110	C6	1450	C7	1706	C7		
2064	E6	2736	A7	3023	A7	3884	C6			1113	D6	1458	D8	1708	D6		
2065	E6	2742	A8	3024	A7	3900	D7			1114	D6	1461	D8	1710	D6		
2066	E6	2745	B9	3025	A7	3913	D7			1116	D6	1462	D8	1711	C6		
2067	E6	2759	A9	3035	A6	3915	D7			1121	A9	1463	D8	1712	C7		
2068	D6	2760	C8	3040	B8	3950	C6			1123	E6	1465	D8	1713	C7		
2101	C6	2763	A7	3044	B8	3951	B6			1124	D5	1467	B9	1715	C7		
2102	C6	2764	C8	3045	A7	3952	D6			1125	C9	1469	B9	1719	C7		
2106	C6	2767	C8	3047	A6	3953	D6			1127	D5	1471	B7	1720	E9		
2107	C6	2801	B7	3050	D6	3954	B6			1132	C6	1476	D6	1740	C6		
2109	C6	2802	A8	3051	D6	3955	D6			1134	C6	1480	B9	1741	D6		
2110	C6	2803	A8	3052	E6	3956	B6			1136	A6	1481	B9	1742	B6		
2112	C6	2804	A8	3053	E6	3957	B6			1139	C6	1482	B9	1743	B6		
2113	C6	2805	A8	3060	D6	3958	C6			1143	D6	1484	B7	1744	A9		
2114	C6	2806	A8	3061	D6	3959	B6			1150	B7	1492	C9	1745	D6		
2117	D6	2807	B7	3138	C9	3960	C6			1153	C6	1504	C8	1747	B6		
2118	A6	2808	A8	3139	D8	3962	B6			1154	C6	1506	C8	1748	C5		
2119	C6	2809	A7	3203	E7	4101	C6			1155	D7	1511	C8	1749	B6		
2121	D6	2810	A8	3205	E7	5000	A9			1158	C7	1513	C8	1750	B6		
2130	C9	2811	A8	3206	D9	5001	B6			1159	D6	1514	B8	1751	C6		
2131	D9	2812	A9	3208	D6	5002	C6			1160	D6	1515	C7	1757	D6		
2133	D9	2813	A8	3209	E9	5003	C6			1161	E9	1516	C8	1758	C7		
2217	D6	2814	A9	3210	D8	5004	C6			1162	D8	1517	C8	1761	A7		
2218	E9	2824	A8	3212	D9	5006	C7			1163	B7	1520	C7	1762	A7		
2219	D9	2825	A8	3213	C7	5007	C7			1164	B7	1522	C8	1766	C6		
2221	D9	2826	A8	3214	D6	5008	C7			1165	C7	1523	A7	1767	C7		
2222	D9	2827	A8	3215	C6	5009	C7			1167	D9	1527	A7	1770	B7		
2227	D6	2828	A8	3217	C6	5010	D6			1168	D9	1534	C8	1771	B6		
2228	B7	2833	C6	3218	C6	5011	E6			1169	C8	1537	C9	1775	B7		
2229	C8	2840	B6	3220	C7	5012	E6			1170	D9	1541	C8	1777	C7		
2230	C7	2841	B6	3221	C8	5300	E9			1171	D9	1542	B9	1778	B7		
2232	D6	2842	B6	3223	D6	5500	B7			1174	A8	1546	C8	1779	B8		
2234	D6	2843	D6	3225	D6	5501	B7			1175	A8	1548	C9	1791	C7		
2300	E7	2844	C6	3251	C8	5601	D8			1176	A8	1550	C8	1792	C7		
2301	E7	2845	C6	3254	D6	5604	D9			1178	A8	1556	C8	1795	C8		
2304	E7	2846	C9	3500	B7	5850	C6			1179	A8	1557	C8	1796	C7		
2305	E7	2847	D9	3501	B7	6007	A7			1180	A8	1564	C8	1797	A9		
2308	E7	2848	C6	3503	B7	6008	D5			1181	A8	1565	A8	1799	D6		
2309	E7	2849	C6	3554	C7	6016	C7			1182	A8	1571	C8	1801	B7		
2313	E7	2850	C7	3555	C7	6017	C6			1183	A8	1578	A9	1813	A7		
2314	E7	2851	C6	3600	B7	6107	D5			1185	C6	1579	C8	1815	B9		

MS4150RS / NAV-R45
Exploded View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MS4150RS / NAV-R45 Spare Parts

Position	Code Number	Article description
	311231609291	IFU/MI MS4150RS (D,NL,F,I,GB) *)
	A2C53052779	IFU NAV-R45 EN, FR, DE, NL, IT *)
	A2C53052781	IFU NAV-R45 ES, DA, SV, US *)
0001	482244330463	SLEEVE
0002-0003	482226321164	AERIAL ADAPTER
0002-0004	482225610293	HOLDER AERIAL ADAPTER
0002-0005	482240420437	DEMOUNTING BRACKETS
1000-0001-0040	311111877070	FAN ASSY
1000-0001-0041	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0042	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0043	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0044	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0073	482253211092	BUFFER MOUNTING REAR
1000-0001-0092	482249271046	SPRING MOUNTING
1000-0001-0098	482249271046	SPRING MOUNTING
1000-0010	311111758670	COVER BOTTOM
1000-0011	311111138710	COVER TOP
1000-1000-0002	311234125030	COVER EMC TOP
1000-1000-0003	311235825970	COVER EMC BOTTOM
1000-1000-0004	311111876540	GPS ANTENNA CABLE ASSY *)
1000-1000-1100	311111713580	CONNECTOR BLOCK
1000-1000-1105	311232857090	UNIT ASSY GPS RECEIVER
1000-1000-1500	311230055840	GYRO EWTS 82NM21 *)
1000-1000-1603	242202514347	FAN CONNECTOR
1000-1000-1900	311111712960	TUNER
1000-1001	313916762700	FRONT UNIT ASSY - **MS4150RS/00**
1000-1001	313916762030	FRONT UNIT ASSY - **MS4150RS/01**
1000-1001	313916762730	FRONT UNIT ASSY - **NAV-R45**
1000-1001-0231	313916761610	KNOB
1001	311235826970	GPS ANTENNA - **MS4150RS/00/01**

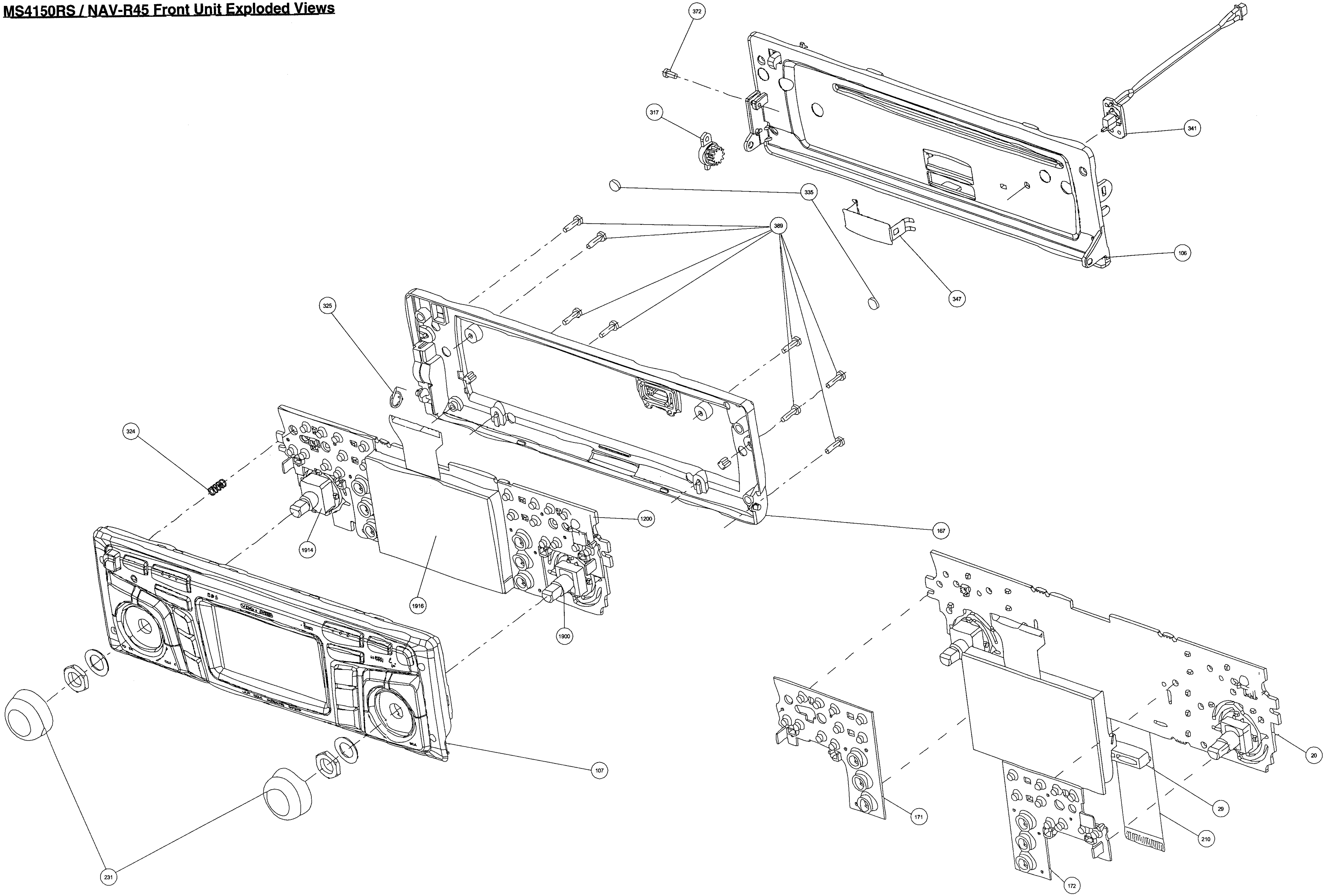
*) - not shown in exploded views

MS4150RS / NAV-R45 Spare Parts

Position	Code Number	Article description
	311231609291	IFU/MI MS4150RS (D,NL,F,I,GB) *)
	A2C53052779	IFU NAV-R45 EN, FR, DE, NL, IT *)
	A2C53052781	IFU NAV-R45 ES, DA, SV, US *)
0001	482244330463	SLEEVE
0002-0003	482226321164	AERIAL ADAPTER
0002-0004	482225610293	HOLDER AERIAL ADAPTER
0002-0005	482240420437	DEMOUNTING BRACKETS
1000-0001-0040	311111877070	FAN ASSY
1000-0001-0041	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0042	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0043	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0044	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0073	482253211092	BUFFER MOUNTING REAR
1000-0001-0092	482249271046	SPRING MOUNTING
1000-0001-0098	482249271046	SPRING MOUNTING
1000-0010	311111758670	COVER BOTTOM
1000-0011	311111138710	COVER TOP
1000-1000-0002	311234125030	COVER EMC TOP
1000-1000-0003	311235825970	COVER EMC BOTTOM
1000-1000-0004	311111876540	GPS ANTENNA CABLE ASSY *)
1000-1000-1100	311111713580	CONNECTOR BLOCK
1000-1000-1105	311232857090	UNIT ASSY GPS RECEIVER
1000-1000-1500	311230055840	GYRO EWTS 82NM21 *)
1000-1000-1603	242202514347	FAN CONNECTOR
1000-1000-1900	311111712960	TUNER
1000-1001	313916762700	FRONT UNIT ASSY - **MS4150RS/00**
1000-1001	313916762030	FRONT UNIT ASSY - **MS4150RS/01**
1000-1001	313916762730	FRONT UNIT ASSY - **NAV-R45**
1000-1001-0231	313916761610	KNOB
1001	311235826970	GPS ANTENNA - **MS4150RS/00/01**

*) - not shown in exploded views

MS4150RS / NAV-R45 Front Unit Exploded Views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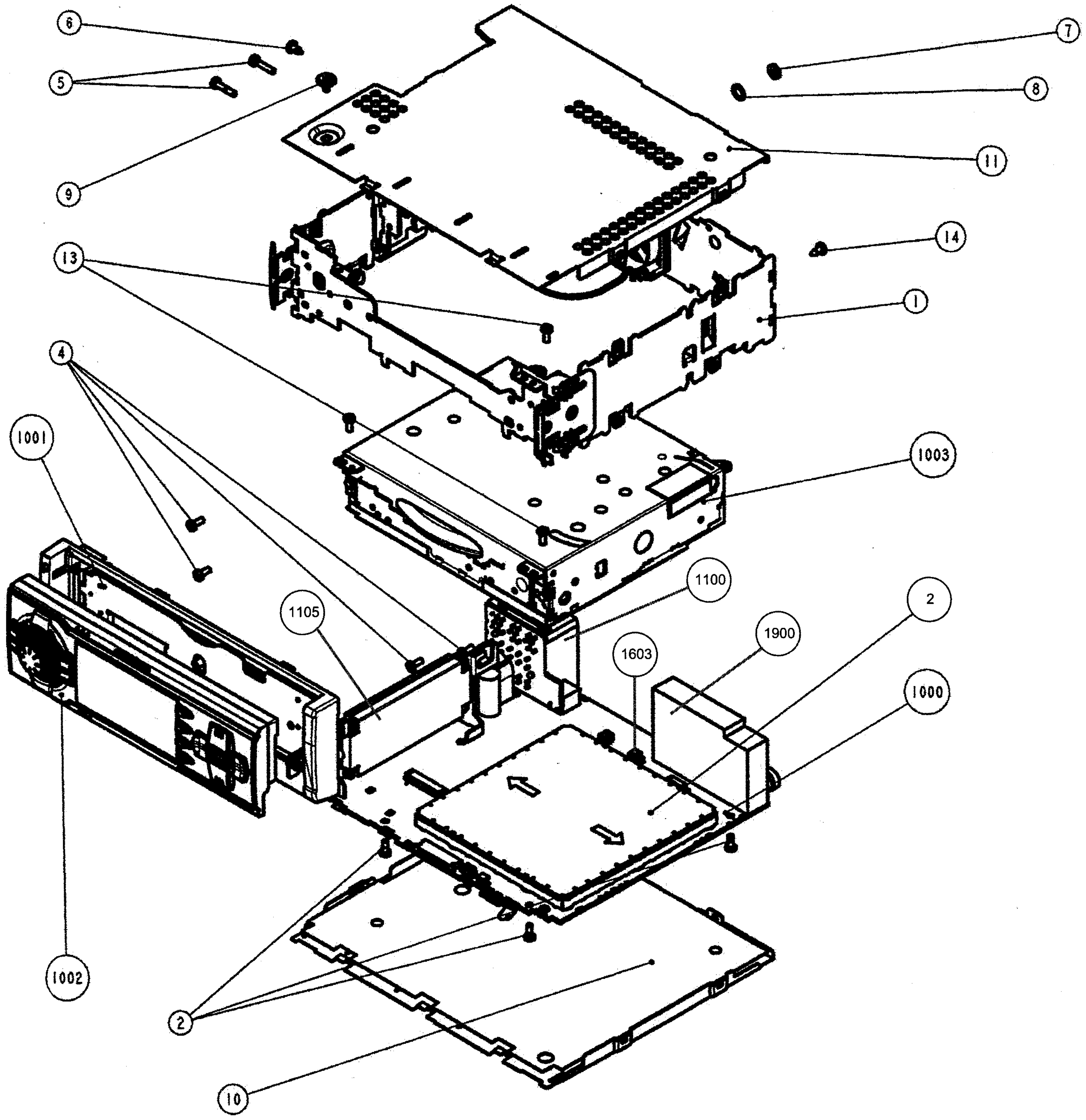
MS4200RS Exploded Views

MS4200RS Set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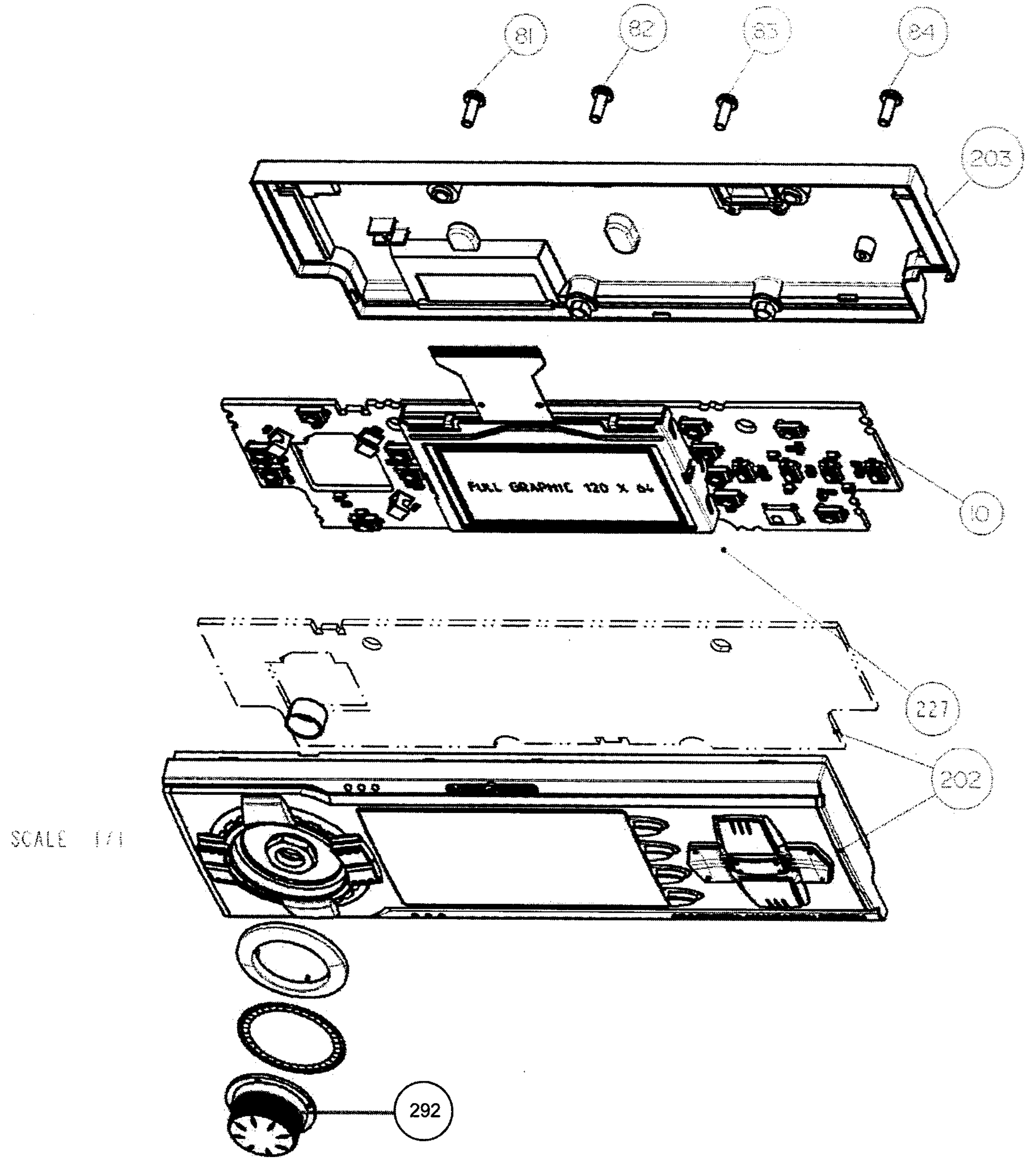
MS4200RS Front Detach Unit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FULL GRAPHIC 120 X 64
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SCALE 1/1
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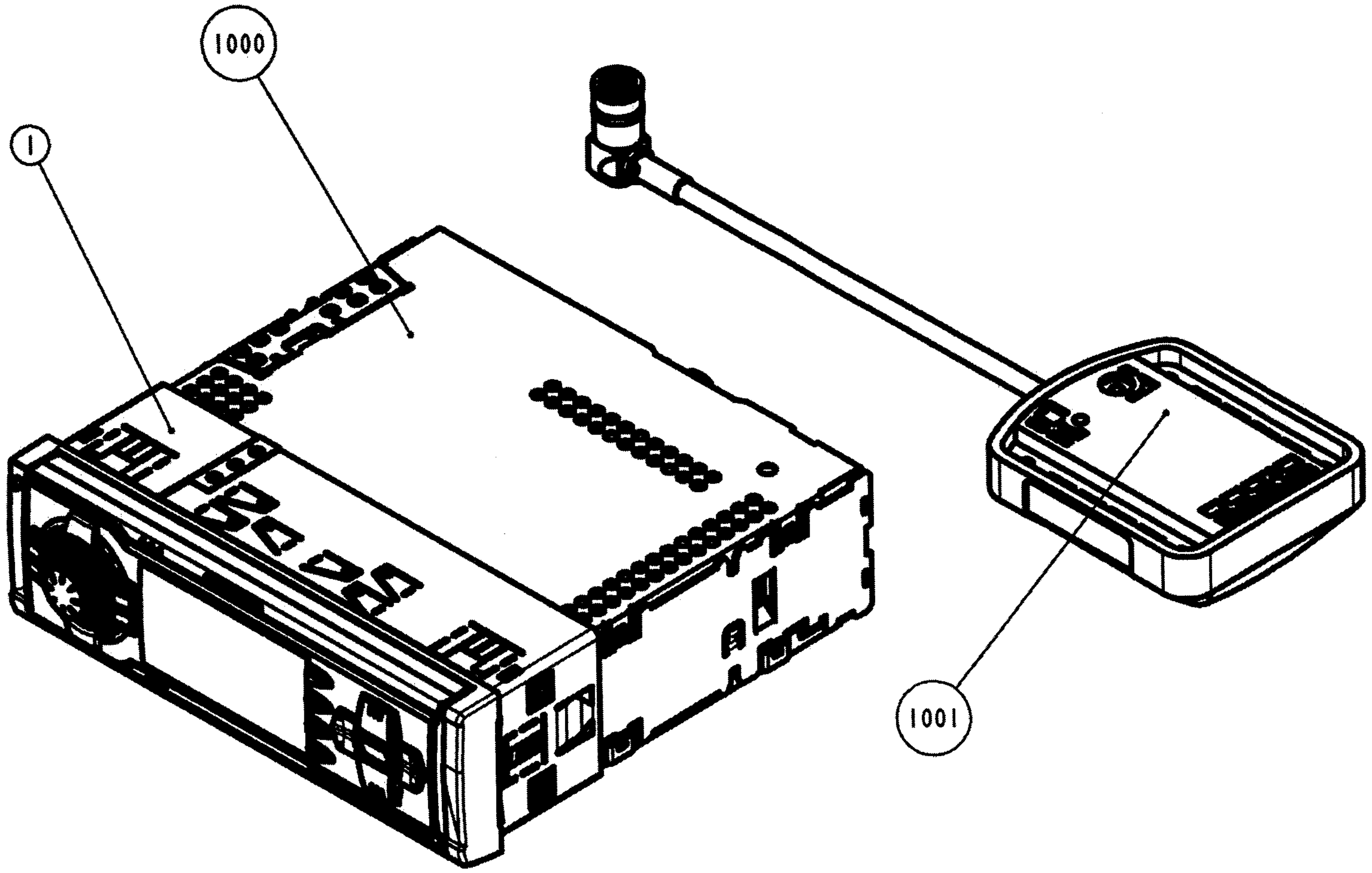
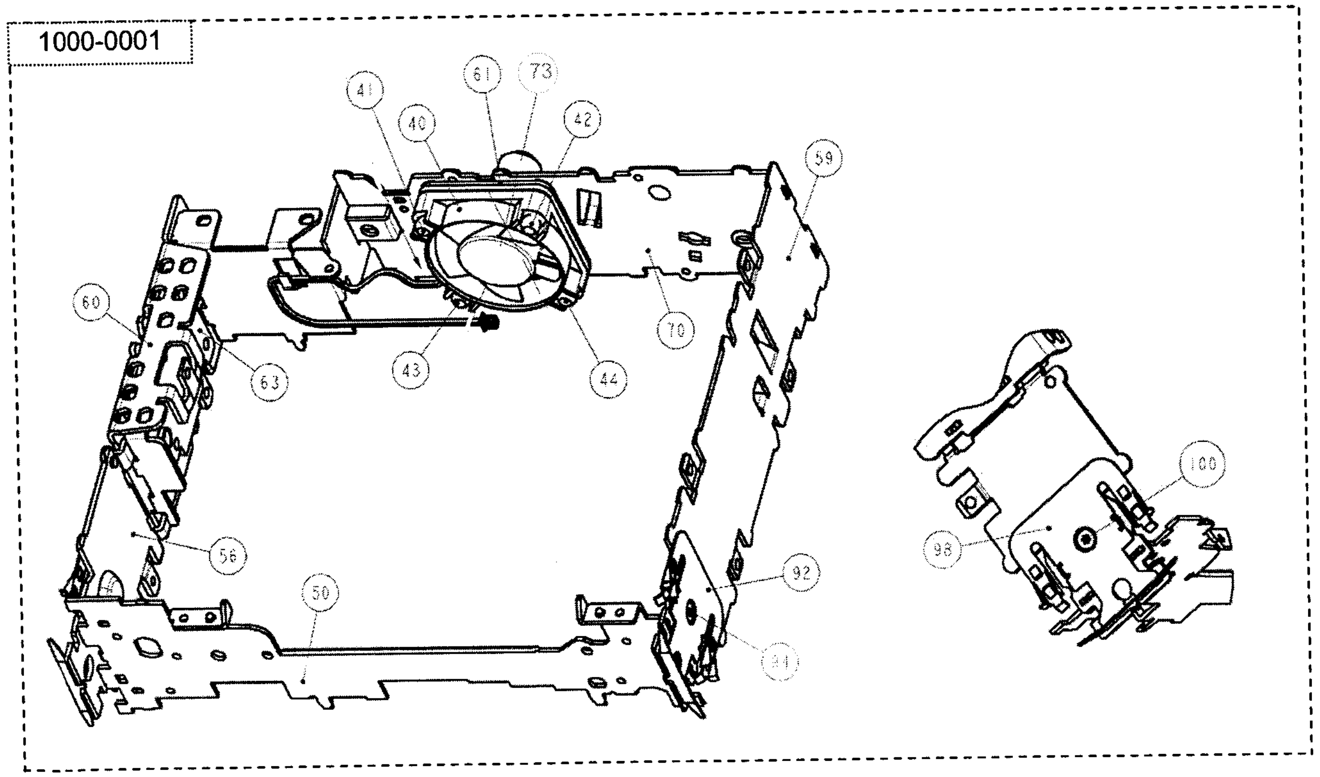
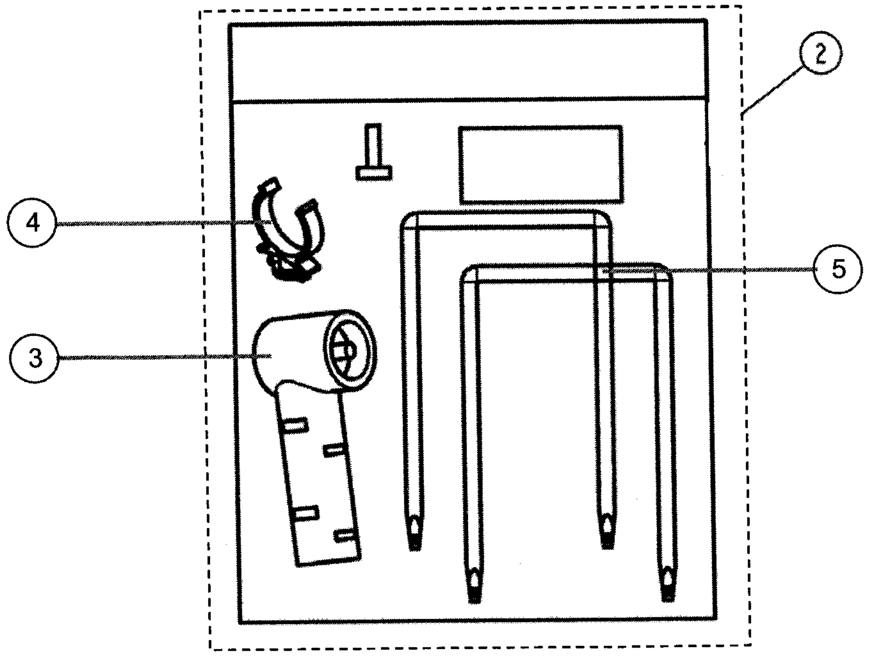
MS4200RS Spare Parts

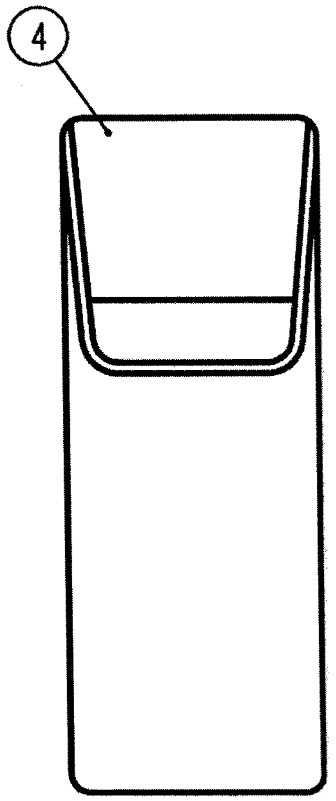
Position	Code Number	Article description
	311231609301	IFU MS4200RS (D, NL, F, I, GB) *)
0001	482244330463	SLEEVE
0002-0003	482226321164	AERIAL ADAPTER
0002-0004	482225610293	HOLDER AERIAL ADAPTER
0002-0005	482240420437	DEMOUNTING BRACKETS
0004	311111466200	CASE DETACHABLE UNIT
1000-0001-0040	311111877070	FAN ASSY
1000-0001-0041	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0042	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0043	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0044	482253212988	BUFFER MOUNTING FAN ASSY
1000-0001-0073	482253211092	BUFFER MOUNTING REAR
1000-0001-0092	482249271046	SPRING MOUNTING
1000-0001-0098	482249271046	SPRING MOUNTING
1000-0010	311111758670	COVER BOTTOM
1000-0011	311111138710	COVER TOP
1000-1000-0002	311234125030	COVER EMC TOP
1000-1000-0003	311235825970	COVER EMC BOTTOM *)
1000-1000-0004	311111876540	GPS ANTENNA CABLE ASSY *)
1000-1000-1100	311111713580	CONNECTOR BLOCK
1000-1000-1105	311232857090	UNIT ASSY GPS RECEIVER
1000-1000-1500	311230055840	GYRO EWTS 82NM21 *)
1000-1000-1603	242202514347	FAN CONNECTOR
1000-1000-1900	311111712960	TUNER
1000-1001	311111713760	ORNAMENTAL PLATE FIXED ASSY - **MS4200RS/00**
1000-1001	311111714020	ORNAMENTAL PLATE FIXED ASSY - **MS4200RS/01**
1000-1001-0232	311111360180	FLEX FOIL FRONT *)
1000-1002	311111760280	DETACHABLE UNIT ASSY - **MS4200RS/00** (SILVER)
1000-1002	311111760300	DETACHABLE UNIT ASSY - **MS4200RS/01** (BLACK)
1000-1002-0292	311111759230	ROTARY KNOB ASSY - **MS4200RS/00**
1000-1002-0292	311111759700	ROTARY KNOB ASSY - **MS4200RS/01**
1001	311235826970	GPS ANTENNA

*) - not shown in exploded views









Partslists

MS4150RS / MS4200RS Versions

MS4150RS SYSTEM

Position	Component	Description
0001	A2C53047715	Sleeve
0002	A2C53054389	Mounting kit assy MIGRATION WET
0003	A2C53051864	SW CD MIGRATION WET
0005	A2C53051776	Sticker
0090	A2C53051838	Sticker
0450	A2C53049076	Folding carton
0451	A2C53051716	Folding carton
0452	A2C53049044	Pad
0453	A2C53048944	Bag
0455	A2C53050217	Sticker
0458	A2C53050686	Sticker
0460	A2C53050799	Sticker
0462	A2C53050686	Sticker
0481	A2C53051767	Pallet
0482	A2C53051728	Folding carton
1000	A2C53057521	Audio navi unit - **MS4150RS/00** - MIGRATION WET
1000	A2C53057520	Audio navi unit - **MS4150RS/01** - MIGRATION WET
1001	A2C53054303	Antenna assy MIGRATION WET

MS4150RS SET

Position	Component	Description
0001	A2C53049475	Frame assy MIGRATION RBT
0002	A2C00029170	Pan head screw
0003	A2C53049545	Cover assy MIGRATION RBT
0004	A2C53047520	Pan head screw
0005	A2C53047529	Pan head screw
0006	A2C53047615	Pan head screw
0007	A2C53047489	Hexagon nut
0008	A2C53047488	Locking ring
0009	A2C53050976	Screw
0010	A2C53049476	Cover assy MIGRATION RBT
0011	A2C53047867	Cover
0013	A2C00029170	Pan head screw
0014	A2C53047615	Pan head screw
0382	A2C53050805	Sticker
0383	A2C53050687	Sticker
0384	A2C53060086	Sticker
0385	A2C53051839	Sticker - **only MS4150RS/01**
0386	A2C53050686	Sticker
1000	A2C53059680	PCB assy TA RNAV MK3 M
1001	A2C53056802	Front plate assy TA 4150RS/00
1001	A2C53056735	Front plate assy TA 4150RS/01
1003	A2C53049279	Drive assy MIGRATION RBT

MS4150RS FRONT UNIT

Position	Component	Description
0029	A2C53056036	Shield
0106	A2C53056660	Front plate assy MIGRATION SGP
0107	A2C53056737	Front plate assy MIGRATION SGP
0167	A2C53056692	Cover assy MIGRATION SGP
0171	A2C53055948	Keypad
0172	A2C53055949	Keypad
0210	A2C53056945	Flexible flat cable
0231	A2C53056693	Knob assy MIGRATION SGP
0317	A2C53056926	Damper
0324	A2C53055488	Spring
0325	A2C53055487	Spring
0335	A2C53048534	Support
0341	A2C53049672	PCB assy MIGRATION RBT
0347	A2C53055500	Shield
0372	A2C53055159	Screw
0389	A2C53047516	Pan head screw
1200	A2C53057055	PCB assy - **MS4150RS/00** - MIGRATION SGP
1200	A2C53057048	PCB assy - **MS4150RS/01** - MIGRATION SGP
1900	A2C53055319	Encoder assy MIGRATION SGP
1914	A2C53051133	Encoder assy MIGRATION WET
1916	A2C53054393	Display assy TA PLF MK45 M

MS4200RS SYSTEM

Position	Component	Description
0001	A2C53047715	Sleeve
0002	A2C53054389	Mounting kit assy MIGRATION WET
0003	A2C53051864	SW CD MIGRATION WET
0004	A2C53048300	Case
0005	A2C53051776	Sticker
0090	A2C53051838	Sticker
0450	A2C53049076	Folding carton
0451	A2C53051719	Folding carton
0452	A2C53049044	Pad
0453	A2C53048944	Bag
0455	A2C53050217	Sticker
0458	A2C53050686	Sticker
0460	A2C53050799	Sticker
0462	A2C53050686	Sticker
0481	A2C53051767	Pallet
0482	A2C53051728	Folding carton
1000	A2C53057522	Audio navi unit - **MS4200RS/00** - MIGRATION WET
1000	A2C53057523	Audio navi unit - **MS4200RS/01** - MIGRATION WET
1001	A2C53054303	Antenna assy MIGRATION WET

MS4200RS SET

Position	Component	Description
0001	A2C53049475	Frame assy MIGRATION RBT
0002	A2C00029170	Pan head screw
0003	A2C53049545	Cover assy MIGRATION RBT
0004	A2C53047520	Pan head screw
0005	A2C53047529	Pan head screw
0006	A2C53047615	Pan head screw
0007	A2C53047489	Hexagon nut
0008	A2C53047488	Locking ring
0009	A2C53050976	Screw
0010	A2C53049476	Cover assy MIGRATION RBT
0011	A2C53047867	Cover
0013	A2C00029170	Pan head screw
0014	A2C53047615	Pan head screw
0246	A2C53048297	Support
0382	A2C53050805	Sticker
0383	A2C53050687	Sticker
0384	A2C53060086	Sticker
0385	A2C53050226	Sticker
0386	A2C53050686	Sticker
1000	A2C53059677	PCB assy TA RNAV MK3 M
1001	A2C53049254	Front ornamental plate assy - **MS4200RS/00** - MIGRATION RBT
1001	A2C53049262	Front ornamental plate assy - **MS4200RS/01** - MIGRATION RBT
1002	A2C53049602	Front detach assy - **MS4200RS/00** - MIGRATION RBT
1002	A2C53049604	Front detach assy - **MS4200RS/01** - MIGRATION RBT
1003	A2C53049279	Drive assy MIGRATION RBT

MS4200RS FRONT ORNAMENTAL PLATE ASSY

Note: There is NO exploded view of the front ornamental plate available.

Position	Component	Description
0040	A2C53049672	PCB assy MIGRATION RBT
0077	A2C53047609	Screw
0078	A2C53047609	Screw
0079	A2C53047609	Screw
0080	A2C53047609	Screw
0091	A2C53047541	Pan head screw
0185	A2C53049381	Felt assy MIGRATION RBT
0187	A2C53048348	Guide
0193	A2C53048311	Support
0194	A2C53048311	Support
0200	A2C53048632	Front plate assy - **MS4200RS/00** - MIGRATION RBT
0200	A2C53048738	Front plate assy - **MS4200RS/01** - MIGRATION RBT
0221	A2C53047757	Flap
0222	A2C53047687	Spring
0234	A2C53049171	Connector
0237	A2C53047690	Spring
0238	A2C53047690	Spring
0239	A2C53047556	Damping assy MIGRATION WET
0244	A2C53048298	Guide
0250	A2C53048293	Gear
0251	A2C53048294	Front plate
0252	A2C53047755	Support
0254	A2C53047608	Screw

0255	A2C53047756	Support
0256	A2C53047758	Spindle
0257	A2C53047759	Spindle
0258	A2C53047552	Retaining ring
0259	A2C53048302	Holder
0262	A2C53047760	Spindle
0265	A2C53047551	Retaining ring
0280	A2C53048710	Button
0281	A2C53047688	Spring
0339	A2C53048309	Light guide
0344	A2C53048305	Light guide

MS4200RS FRONT DETACH UNIT

Position	Component	Description
0010	A2C53049884	PCB assy - MIGRATION RBT
0081	A2C53047609	Screw
0082	A2C53047609	Screw
0083	A2C53047609	Screw
0084	A2C53047609	Screw
0202	A2C53049603	Cover assy - **MS4200RS/00** - MIGRATION RBT
0202	A2C53049605	Cover assy - **MS4200RS/01** - MIGRATION RBT
0203	A2C53049513	Cover assy - **MS4200RS/00** - MIGRATION RBT
0203	A2C53049550	Cover assy - **MS4200RS/01** - MIGRATION RBT
0227	A2C53053259	Display assy - MIGRATION WET

MAIN PCB MS4150RS / MS4200RS

Note: All position numbers and components are valid for both MS4150RS- and MS4200RS versions, unless otherwise noted.

Position	Component	Description
0001	A2C53059683	circuit board
0002	A2C53047921	cover
0003	A2C53047785	holder
0004	A2C53049715	GPS antenna cable assy
1100	A2C53049238	connector
1101	A2C53047411	connector
1102	A2C53047439	connector
1103	A2C53047414	connector
1105	A2C53053275	GPS receiver assy MIGRATION WET
1200	A2C53018904	quartz 54 177 067
1300	A2C53054004	frame
1500	A2C00028086	OTHER,MODULE/EWTS82NM21
1501	A2C53050032	connector
1602	A2C53047470	connector
1603	A2C53047397	connector
1604	A2C00024344	6MHz,0.5%,CSTCC_MG,PAS RESO
1700	A2C00027131	11.29MHz,0.005%,CX-49G,PAS RESO
1850	A2C53006382	quartz 54 177 051
1900	A2C53049198	tuner assy MIGRATION RBT
1901	A2C53047470	connector
2000	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2001	A2C00002196	4.7nF,10%,50V,X7R,0603,TINNED,CER CAP/
2002	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2003	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2004	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2005	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2006	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2007	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2008	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2012	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2013	A2C53028478	47 µF, ELEC_CAP
2014	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2015	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2016	A2C00026710	10uF,20%,50V,SMD,AL,ELEC CAP/VS-SERIE
2017	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2019	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2020	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2021	A2C00027184	22uF,20%,16V,SMD,TA,ELEC CAP/B45197-A422
2022	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2023	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2024	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2025	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2026	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2027	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2028	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2029	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2030	A2C00002204	330pF,5%,50V,C0G,0603,TINNED,CER CAP/
2033	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/

2035	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2036	A2C00027184	22uF,20%,16V,SMD,TA,ELEC CAP/B45197-A422
2039	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2040	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2041	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2042	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2043	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2044	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2045	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2046	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2047	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2054	A2C53028478	47 µF, ELEC_CAP
2055	A2C00002185	33nF,10%,50V,X7R,0805,TINNED,CER CAP/
2057	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2058	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2059	A2C00026710	10uF,20%,50V,SMD,AL,ELEC CAP/VS-SERIE
2060	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2061	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2062	A2C53031196	100 µF, ELEC_CAP
2063	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2065	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2066	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2067	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2068	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2100	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2101	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2102	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2104	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2106	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2107	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2109	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2110	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2112	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2113	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2114	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2117	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2118	A2C53031196	100 µF, ELEC_CAP
2119	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2120	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2121	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2129	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2130	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2131	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2132	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2133	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2200	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2202	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2203	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2204	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2205	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2206	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2207	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2208	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2209	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2210	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2211	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2212	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2213	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2214	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2215	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2216	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2217	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2218	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2219	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2221	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2222	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2223	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2226	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2227	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2228	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2229	A2C00020874	10pF,0.5pF,50V,C0G,0603,TINNED,CER CAP/
2230	A2C00020874	10pF,0.5pF,50V,C0G,0603,TINNED,CER CAP/
2232	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2234	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2300	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2301	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2304	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2305	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2308	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2309	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/

2311	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2312	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2313	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2314	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2315	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2316	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2317	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2318	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2319	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2320	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2330	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2401	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2403	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2404	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2426	A2C00027368	2.7nF,10%,50V,X7R,0603,TINNED,CER CAP/
2427	A2C00026848	270pF,5%,50V,C0G,0603,,CER CAP/
2428	A2C00002102	220pF,5%,50V,C0G,0603,TINNED,CER CAP/
2429	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2430	A2C00006482	180pF,5%,50V,C0G,0603,TINNED,CER CAP/
2431	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2500	A2C00027103	470nF,20%,16V,X7R,0805,,CER CAP/
2501	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2503	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2504	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2505	A2C53028478	47 µF, ELEC_CAP
2506	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2507	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2508	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2509	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2512	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2513	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2515	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2516	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2518	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2520	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2521	A2C00027103	470nF,20%,16V,X7R,0805,,CER CAP/
2522	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2524	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2600	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2601	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2602	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2604	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2605	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2606	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2607	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2608	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2609	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2610	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2613	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2614	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2615	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2616	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2617	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2618	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2621	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2622	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2624	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2630	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2632	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2633	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2634	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2635	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2636	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2700	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2701	A2C53031196	100 µF, ELEC_CAP
2702	A2C53031196	100 µF, ELEC_CAP
2703	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2707	A2C00002102	220pF,5%,50V,C0G,0603,TINNED,CER CAP/
2708	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2710	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2713	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2714	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2715	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2716	A2C53028455	22 µF, ELEC_CAP
2717	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2718	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2719	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2720	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2721	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2722	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/

2723	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2724	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2726	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2727	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2729	A2C53028455	22 µF, ELEC_CAP
2730	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2731	A2C53028455	22 µF, ELEC_CAP
2732	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2733	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2734	A2C53028455	22 µF, ELEC_CAP
2735	A2C53028455	22 µF, ELEC_CAP
2736	A2C53028455	22 µF, ELEC_CAP
2738	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2740	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2741	A2C00002104	27pF,5%,50V,C0G,0603,TINNED,CER CAP/
2743	A2C00002204	330pF,5%,50V,C0G,0603,TINNED,CER CAP/
2744	A2C00002104	27pF,5%,50V,C0G,0603,TINNED,CER CAP/
2748	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2749	A2C00002109	18pF,5%,50V,C0G,0603,TINNED,CER CAP/
2750	A2C00002109	18pF,5%,50V,C0G,0603,TINNED,CER CAP/
2753	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2760	A2C53031196	100 µF, ELEC_CAP
2761	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2762	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2763	A2C53028455	22 µF, ELEC_CAP
2764	A2C53028455	22 µF, ELEC_CAP
2801	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2802	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2803	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2804	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2805	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2806	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2807	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2808	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2809	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2810	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2811	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2812	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2813	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2814	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2815	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2816	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2817	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2818	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2821	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2822	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2823	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2824	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2825	A2C53031196	100 µF, ELEC_CAP
2829	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2830	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2831	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2832	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2833	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2834	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2839	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2840	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2841	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2842	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2843	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2844	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2845	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2846	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2847	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2848	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2849	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2850	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2851	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2852	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2853	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2854	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2856	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2857	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2858	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2859	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2860	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2861	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2862	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2864	A2C53028455	22 µF, ELEC_CAP
2865	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/

2866	A2C00002185	33nF,10%,50V,X7R,0805,TINNED,CER CAP/
2868	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2869	A2C00020218	12pF,5%,50V,C0G,0603,TINNED,CER CAP/
2871	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2873	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2874	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2875	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2876	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2877	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2878	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2879	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2885	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2887	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2888	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2889	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2890	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2891	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2894	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2895	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2896	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2897	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2898	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2899	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2902	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2904	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2905	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2906	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2907	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2908	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2909	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2950	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2951	A2C53028478	47 µF, ELEC_CAP
2952	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2953	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2956	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2957	A2C00002190	2.2nF,10%,50V,X7R,0603,TINNED,CER CAP/
2958	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2963	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2964	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2965	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2966	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
3001	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3002	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3005	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3006	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3007	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3008	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3009	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3010	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3011	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3012	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3013	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3014	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3015	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3017	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3018	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3020	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3021	A2C00025198	1K8,1%,TK100,63mW,0603,LIN RES/
3022	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3023	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3024	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3025	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3026	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3027	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3028	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3029	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3030	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3031	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3033	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3034	A2C00004540	5K6,1%,TK100,63mW,0603,LIN RES/
3035	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3036	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3037	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3038	A2C00003838	220K,5%,TK250,63mW,0603,LIN RES/
3039	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3040	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3041	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3044	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3045	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3046	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/

3047	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3049	A2C00003812	6K8,5%,TK250,63mW,0603,LIN RES/
3050	A2C00027904	0R047,1%,TK200,1W,1218,LIN RES/PRC201
3051	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3052	A2C00025209	2K7,1%,TK100,63mW,0603,LIN RES/
3053	A2C00017792	1K2,1%,TK100,63mW,0603,LIN RES/
3054	A2C00025247	6K8,1%,TK100,63mW,0603,LIN RES/
3055	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3060	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3061	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3100	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3101	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3102	A2C00003986	15R,5%,TK200,125mW,0805,LIN RES/
3103	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3104	A2C00003428	3K9,5%,TK250,125mW,0805,LIN RES/
3105	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3106	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3107	A2C00003418	22R,5%,TK250,125mW,0805,LIN RES/
3108	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3109	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3110	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3111	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3112	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3113	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3114	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3116	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3123	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3124	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3125	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3126	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3127	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3134	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3136	A2C00003752	680R,5%,TK250,63mW,0603,LIN RES/
3137	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3138	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3139	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3149	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3153	A2C00003752	680R,5%,TK250,63mW,0603,LIN RES/
3156	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3157	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3158	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3161	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3201	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3202	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3203	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3205	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3206	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3207	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3208	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3209	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3210	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3211	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3212	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3213	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3214	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3216	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3217	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3218	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3220	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3221	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3223	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3225	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3226	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3228	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3250	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3251	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3254	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3351	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3403	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3404	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3405	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3406	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3407	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3410	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3486	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3487	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3488	A2C00003842	120K,5%,TK200,63mW,0603,LIN RES/
3489	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3500	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3501	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/

3503	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3514	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3515	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3521	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3527	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3528	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3530	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3531	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3532	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3533	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3534	A2C00025247	6K8,1%,TK100,63mW,0603,LIN RES/
3535	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3536	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3537	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3538	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3541	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3542	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3543	A2C00003853	470K,5%,TK250,63mW,0603,LIN RES/
3544	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3554	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3555	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3560	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3562	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3600	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3603	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3605	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3607	A2C00003410	22K,5%,TK250,125mW,0805,LIN RES/
3609	A2C00003410	22K,5%,TK250,125mW,0805,LIN RES/
3610	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3611	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3612	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3621	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3622	A2C00028144	0R,13R,0W,VAR RES/B59101-P1080-A62
3623	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3624	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3625	A2C00028144	0R,13R,0W,VAR RES/B59101-P1080-A62
3628	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3629	A2C00003778	10R,5%,TK250,125mW,0805,LIN RES/
3631	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3636	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3639	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3643	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3645	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3650	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3700	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3701	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3702	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3703	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3704	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3705	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3706	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3707	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3708	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3709	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3710	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3711	A2C00003996	1K2,5%,TK250,63mW,0603,LIN RES/
3712	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3713	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3714	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3715	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3716	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3717	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3718	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3719	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3721	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3723	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3724	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3725	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3726	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3727	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3729	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3730	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3731	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3732	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3735	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3736	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3737	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3738	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3739	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3740	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/

3741	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3749	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3751	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3756	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3759	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3800	A2C00005577	330K,5%,TK200,63mW,0603,LIN RES/
3801	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3802	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3803	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3804	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3805	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3806	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3807	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3808	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3809	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3810	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3811	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3812	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3813	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3814	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3817	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3818	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3819	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3823	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3824	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3825	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3827	A2C00003838	220K,5%,TK250,63mW,0603,LIN RES/
3828	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3829	A2C53051389	RESISTOR PTC PRF18
3850	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3851	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3852	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3853	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3854	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3855	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3856	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3857	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3858	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3860	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3862	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3864	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3865	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3867	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3868	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3869	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3870	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3871	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3872	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3873	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3874	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3875	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3876	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3877	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3878	A2C00003693	470R,5%,TK250,63mW,0603,LIN RES/
3879	A2C00003693	470R,5%,TK250,63mW,0603,LIN RES/
3880	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3881	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3882	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3883	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3884	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3890	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3891	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3892	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3893	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3894	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3895	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3896	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3897	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3900	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3901	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3902	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3903	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3905	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3906	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3908	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3909	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3911	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3912	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3913	A2C00004463	10K,1%,TK100,63mW,0603,LIN RES/
3915	A2C00027820	10K,3620,0805,NTC/NTC

3950	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3951	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3952	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3953	A2C00003688	180K,5%,TK200,63mW,0603,LIN RES/
3954	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3955	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3956	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3957	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3958	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3959	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3960	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3962	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
4101	A2C00004349	0R05,63mW,1A,0603,JUMPER/ - **only MS4150RS**
5000	A2C00026943	97uH,10A,HOL,COIL/311111710910
5001	A2C00026976	10uH,2A,SMD,COIL/7A06N-100L
5002	A2C00027583	160nH,0A,SMD,COIL/BDS3/3/8.9-4S2
5003	A2C00026977	12uH,1.5A,SMD,COIL/7A06L-120K
5004	A2C00004974	80nH,5A,SMD,COIL/
5005	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5006	A2C00027583	160nH,0A,SMD,COIL/BDS3/3/8.9-4S2
5007	A2C00026977	12uH,1.5A,SMD,COIL/7A06L-120K
5008	A2C00004974	80nH,5A,SMD,COIL/
5009	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5010	A2C00004974	80nH,5A,SMD,COIL/
5011	A2C00026976	10uH,2A,SMD,COIL/7A06N-100L
5012	A2C00004974	80nH,5A,SMD,COIL/
5400	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5500	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5501	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5601	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5604	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5700	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5701	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5850	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5851	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5903	A2C00027149	10uH,150mA,SMD,COIL/NL322522T-100J
5904	A2C00027149	10uH,150mA,SMD,COIL/NL322522T-100J
5905	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
6000	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6002	A2C00026373	16V,200mW,SOD323,ZENER/UDZS-TE17-16B
6004	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6005	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6006	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6007	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6008	A2C00027449	RED, LED, 635nm, OPTO/Q62703-Q2835 - **only MS4200RS**
6009	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6016	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
6017	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
6100	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6101	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6102	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re
6103	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re
6104	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6105	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6106	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6107	A2C00027451	RED,LED,635m,OPTO/Q62703-Q2357
6108	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6109	A2C00027451	RED,LED,635m,OPTO/Q62703-Q2357
6111	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6112	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re
6113	A2C00026370	11V,200mW,SOD323,ZENER/UDZS-TE17-11B
6115	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re
6201	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6300	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6301	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6500	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6501	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6509	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6601	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6612	A2C00026402	15V,1W,SOD106,ZENER/PTZ-TE25-4.7B
6613	A2C00026402	15V,1W,SOD106,ZENER/PTZ-TE25-4.7B
6614	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6803	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6804	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6851	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6852	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6950	A2C00026375	20V,200mW,SOD323,ZENER/UDZS-TE17-20B
6951	A2C00026375	20V,200mW,SOD323,ZENER/UDZS-TE17-20B
6958	A2C53001683	DIODE STPS340S
6961	A2C52058752	DIODE SMBYT03

6962	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
7001	A2C00000446	BIP TRANSISTOR / BC847B NPN
7002	A2C00026299	1,OTHER,LOGIC/VN06SP
7003	A2C00026698	4.9V,40V,1.7A,VOLT REG/L4938NDP
7004	A2C00000446	BIP TRANSISTOR / BC847B NPN
7005	A2C00026529	8.16V,16V,1A,VOLT REG/LF85C
7006	A2C00000446	BIP TRANSISTOR / BC847B NPN
7007	A2C52058771	VOLTAGE SWITCH F/ ANTENNA, VN800
7008	A2C00026458	1,OTHER,LOGIC/SAA1305T
7009	A2C52058193	SWITCH_MODE VOLT_REG., LT1376CS-SL30399
7010	A2C52004675	POWER SUPERVISOR, LTC947
7012	A2C52058193	SWITCH_MODE VOLT_REG., LT1376CS-SL30399
7013	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7014	A2C53009401	FIXED VOLTAGE REG., LD1086D2T80
7015	A2C00027130	FET TRANSISTOR, SI3443DV
7016	A2C53017125	SWITCH_MODE VOLT_REG., LTC1772ES6
7017	A2C00000446	BIP TRANSISTOR / BC847B NPN
7018	A2C00000446	BIP TRANSISTOR / BC847B NPN
7101	A2C53002205	OP-AMP, 2-F., TS912
7103	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7104	A2C00000446	BIP TRANSISTOR / BC847B NPN
7105	A2C00025838	NPN,NORMAL,1A,80V,BIP/BCP56-16
7107	A2C00000446	BIP TRANSISTOR / BC847B NPN
7108	A2C00000446	BIP TRANSISTOR / BC847B NPN
7109	A2C00000522	BIP TRANSISTOR / BC857B PNP
7111	A2C00025838	NPN,NORMAL,1A,80V,BIP/BCP56-16
7112	A2C00000446	BIP TRANSISTOR / BC847B NPN
7203	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7207	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7250	A2C00030057	1,OTHER,LOGIC/PRASIC 1.2
7252	A2C00000446	BIP TRANSISTOR / BC847B NPN
7304	A2C00010657	DRAM,128Mbit,4*2Mbit*16,12ns,TSOP 54,-40
7305	A2C00010657	DRAM,128Mbit,4*2Mbit*16,12ns,TSOP 54,-40
7306	A2C53051161	NAND-FLASH, K9F5608U0B-Y1B0 - **only MS4150RS**
7306	A2C53051162	NAND-FLASH, K9F5608U0B-Y1B0 - **only MS4200RS**
7404	A2C00026269	VOICE SYNTHESIZER, MSM6585GS
7420	A2C53002205	OP-AMP, 2-F., TS912
7500	A2C53058680	OP-AMP, 4-F., MC3302D
7502	A2C53022184	ADC, 1 CHANNEL, 12BIT, LTC1860IMS8
7503	A2C52058674	VOLTAGE REG., 5VDC, LE50
7600	A2C53026420	HEX SCHMITT TRIG. 74HCT14PW
7606	A2C00000446	BIP TRANSISTOR / BC847B NPN
7607	A2C00000563	45V,0.5A, h{FE} >250, SOT-23, fT=100MHz
7608	A2C00027979	1,TRANSC,LOGIC/MSM6307GS-VK
7612	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7700	A2C00000446	BIP TRANSISTOR / BC847B NPN
7701	A2C00000446	BIP TRANSISTOR / BC847B NPN
7702	A2C00026733	RADIO DSP,OTHER IC/SAA7708/N203
7802	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7803	A2C00028411	4,AMPLI/
7850	A2C53050035	MICROPROCESSOR C161CS
7853	A2C00026596	EEPROM,32Kbit,4kX8BIT,0s,SO8,-40C,85C,ME
7854	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7855	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7856	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7858	A2C53051163	FLASH MEMORY AM29F800B
7950	A2C00000446	BIP TRANSISTOR / BC847B NPN
7951	A2C00000446	BIP TRANSISTOR / BC847B NPN
7953	A2C00030056	1,MULTI,LOGIC/74HCT4053D

NAV-R45 (Subaru) Version

NAV-R45 SYSTEM

Position	**Component**	**Description**
0001	A2C53047715	Sleeve
0006	A2C53051865	SW CD MIGRATION WET
0090	A2C53051842	Sticker
0091	A2C53052774	Sticker
0092	A2C53052779	Operating instructions
0093	A2C53052781	Operating instructions
0450	A2C53049076	Folding carton
0451	A2C53051713	Folding carton
0452	A2C53049044	Pad
0453	A2C53048944	Bag
0455	A2C53050217	Sticker
0460	A2C53050799	Sticker
0481	A2C53051767	Pallet
0482	A2C53051728	Folding carton
1000	A2C53057734	Audio navi unit MIGRATION WET

NAV-R45 SET

Position	**Component**	**Description**
0001	A2C53049475	Frame assy MIGRATION RBT
0002	A2C00029170	Pan head screw
0003	A2C53049545	Cover assy MIGRATION RBT
0004	A2C53047520	Pan head screw
0005	A2C53047529	Pan head screw
0006	A2C53047615	Pan head screw
0007	A2C53047489	Hexagon nut
0008	A2C53047488	Locking ring
0009	A2C53050976	Screw
0010	A2C53049476	Cover assy MIGRATION RBT
0011	A2C53047867	Cover
0013	A2C00029170	Pan head screw
0014	A2C53047615	Pan head screw
0382	A2C53050805	Sticker
0383	A2C53050687	Sticker
0384	A2C53060086	Sticker
0385	A2C53051843	Sticker
0386	A2C53050686	Sticker
1000	A2C53053955	PCB assy MIGRATION WET
1001	A2C53056805	Front plate assy SUBNAV-R45
1003	A2C53049279	Drive assy MIGRATION RBT

NAV-R45 FRONT UNIT

Position	**Component**	**Description**
0029	A2C53056036	Shield
0106	A2C53056660	Front plate assy MIGRATION SGP
0107	A2C53056806	Front plate assy MIGRATION SGP
0167	A2C53056692	Cover assy MIGRATION SGP
0171	A2C53055948	Keypad
0172	A2C53055949	Keypad
0210	A2C53056945	Flexible flat cable
0231	A2C53056693	Knob assy MIGRATION SGP
0317	A2C53056926	Damper
0324	A2C53055488	Spring
0325	A2C53055487	Spring
0335	A2C53048534	Support
0341	A2C53049672	PCB assy MIGRATION RBT
0372	A2C53055159	Screw
0389	A2C53047516	Pan head screw
1200	A2C53057057	PCB assy MIGRATION SGP
1900	A2C53055319	Encoder assy MIGRATION SGP
1914	A2C53051133	Encoder assy MIGRATION WET
1916	A2C53054393	Display assy TA PLF MK45 M
6900	A2C53058671	Module assy MIGRATION WET

NAV-R45 MAIN PCB

Position	**Component**	**Description**
0001	A2C53059683	circuit board
0002	A2C53047921	cover
0003	A2C53047785	holder
0004	A2C53049715	GPS antenna cable assy

1100	A2C53049238	connector
1101	A2C53047411	connector
1102	A2C53047439	connector
1103	A2C53047414	connector
1105	A2C53053275	GPS receiver assy MIGRATION WET
1200	A2C53018904	quartz
1300	A2C53054004	frame
1500	A2C00028086	OTHER,MODULE/EWTS82NM21
1501	A2C53050032	connector
1603	A2C53047397	connector
1700	A2C00027131	11.29MHz,0.005%,CX-49G,PAS RESO
1850	A2C53006382	quartz 54 177 051
1900	A2C53049198	tuner assy MIGRATION RBT
1901	A2C53047470	connector
2000	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2001	A2C00002196	4.7nF,10%,50V,X7R,0603,TINNED,CER CAP/
2002	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2003	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2004	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2005	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2006	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2007	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2008	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2012	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2013	A2C53028478	47 µF, ELEC_CAP
2014	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2015	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2016	A2C00026710	10uF,20%,50V,SMD,AL,ELEC CAP/VS-SERIE
2017	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2019	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2020	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2021	A2C00027184	22uF,20%,16V,SMD,TA,ELEC CAP/B45197-A422
2022	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2023	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2024	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2025	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2026	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2027	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2028	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2029	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2030	A2C00002204	330pF,5%,50V,C0G,0603,TINNED,CER CAP/
2033	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2035	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2036	A2C00027184	22uF,20%,16V,SMD,TA,ELEC CAP/B45197-A422
2039	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2040	A2C00027425	10uF,80%,16V,OTHER,1210,,CER CAP/C3225Y5
2041	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2042	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2043	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2044	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2045	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2046	A2C00025022	2.2mF,20%,16V,HOL,AL,ELEC CAP/
2047	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2054	A2C53028478	47 µF, ELEC_CAP
2055	A2C00002185	33nF,10%,50V,X7R,0805,TINNED,CER CAP/
2057	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2058	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2059	A2C00026710	10uF,20%,50V,SMD,AL,ELEC CAP/VS-SERIE
2060	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2061	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2062	A2C53031196	100 µF, ELEC_CAP
2063	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2065	A2C00026873	22uF,20%,10V,OTHER,1210,,CER CAP/
2066	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2067	A2C00027688	4.7uF,10%,10V,X7R,1206,,CER CAP/GRM31CR6
2068	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2100	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2101	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2102	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2104	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2106	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2107	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2109	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2110	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2112	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2113	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2114	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2117	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2118	A2C53031196	100 µF, ELEC_CAP
2119	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/

2120	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2121	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2129	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2130	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2131	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2132	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2133	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2200	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2202	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2203	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2204	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2205	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2206	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2207	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2208	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2209	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2210	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2211	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2212	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2213	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2214	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2215	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2216	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2217	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2218	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2219	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2221	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2222	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2223	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2226	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2227	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2228	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2229	A2C00020874	10pF,0.5pF,50V,C0G,0603,TINNED,CER CAP/
2230	A2C00020874	10pF,0.5pF,50V,C0G,0603,TINNED,CER CAP/
2232	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2234	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2300	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2301	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2304	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2305	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2308	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2309	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2311	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2312	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2313	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2314	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2315	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2316	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2317	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2318	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2319	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2320	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2330	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2401	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2403	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2404	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2426	A2C00027368	2.7nF,10%,50V,X7R,0603,TINNED,CER CAP/
2427	A2C00026848	270pF,5%,50V,C0G,0603,,CER CAP/
2428	A2C00002102	220pF,5%,50V,C0G,0603,TINNED,CER CAP/
2429	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2430	A2C00006482	180pF,5%,50V,C0G,0603,TINNED,CER CAP/
2431	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2500	A2C00027103	470nF,20%,16V,X7R,0805,,CER CAP/
2501	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2503	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2504	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2505	A2C53028478	47 µF, ELEC_CAP
2506	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2507	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2508	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2509	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2512	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2513	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2515	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2516	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2518	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2520	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2521	A2C00027103	470nF,20%,16V,X7R,0805,,CER CAP/
2522	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2524	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/

2600	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2601	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2602	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2604	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2605	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2606	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2607	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2608	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2609	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2610	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2615	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2616	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2617	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2618	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2621	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2622	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2630	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2632	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2633	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2634	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2635	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2636	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2700	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2701	A2C53031196	100 µF, ELEC_CAP
2702	A2C53031196	100 µF, ELEC_CAP
2703	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2707	A2C00002102	220pF,5%,50V,C0G,0603,TINNED,CER CAP/
2708	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2710	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2713	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2714	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2715	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2716	A2C53028455	22 µF, ELEC_CAP
2717	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2718	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2719	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2720	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2721	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2722	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2723	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2724	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2726	A2C00002057	560pF,5%,50V,C0G,0603,TINNED,CER CAP/
2727	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2729	A2C53028455	22 µF, ELEC_CAP
2730	A2C00002211	47nF,10%,16V,X7R,0603,TINNED,CER CAP/
2731	A2C53028455	22 µF, ELEC_CAP
2732	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2733	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2734	A2C53028455	22 µF, ELEC_CAP
2735	A2C53028455	22 µF, ELEC_CAP
2736	A2C53028455	22 µF, ELEC_CAP
2738	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2740	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2741	A2C00002104	27pF,5%,50V,C0G,0603,TINNED,CER CAP/
2743	A2C00002204	330pF,5%,50V,C0G,0603,TINNED,CER CAP/
2744	A2C00002104	27pF,5%,50V,C0G,0603,TINNED,CER CAP/
2748	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2749	A2C00002109	18pF,5%,50V,C0G,0603,TINNED,CER CAP/
2750	A2C00002109	18pF,5%,50V,C0G,0603,TINNED,CER CAP/
2753	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2760	A2C53031196	100 µF, ELEC_CAP
2761	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2762	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2763	A2C53028455	22 µF, ELEC_CAP
2764	A2C53028455	22 µF, ELEC_CAP
2801	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2802	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2803	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2804	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2805	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2806	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2807	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2808	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2809	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2810	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2811	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2812	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2813	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2814	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2815	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21

2816	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2817	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2818	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2821	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2822	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2823	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2824	A2C00027369	3.3nF,10%,50V,X7R,0603,TINNED,CER CAP/
2825	A2C53031196	100 µF, ELEC_CAP
2829	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2830	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2831	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2832	A2C00026824	1uF,80%,16V,OTHER,0805,,CER CAP/GRM21
2833	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2834	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2839	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2840	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2841	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2842	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2843	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2844	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2845	A2C00002201	10nF,10%,50V,X7R,0603,TINNED,CER CAP/
2846	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2847	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2848	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2849	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2850	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2851	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2852	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2853	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2854	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2856	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2857	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2858	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2859	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2860	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2861	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2862	A2C00006952	100nF,10%,16V,X7R,0603,TINNED,CER CAP/
2864	A2C53028455	22 µF, ELEC_CAP
2865	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/
2866	A2C00002185	33nF,10%,50V,X7R,0805,TINNED,CER CAP/
2868	A2C00002144	22pF,5%,50V,C0G,0603,TINNED,CER CAP/
2869	A2C00020218	12pF,5%,50V,C0G,0603,TINNED,CER CAP/
2871	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2873	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2874	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2875	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2876	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2877	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2878	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2879	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2885	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2887	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2888	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2889	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2890	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2891	A2C00002208	1nF,10%,50V,X7R,0603,TINNED,CER CAP/
2894	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2895	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2896	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2897	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2898	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2899	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2902	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2904	A2C00027401	22nF,10%,16V,X7R,0603,,CER CAP/
2905	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2906	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2907	A2C00002209	220nF,10%,16V,X7R,0805,TINNED,CER CAP/
2908	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2909	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2950	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2951	A2C53028478	47 µF, ELEC_CAP
2952	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2953	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2956	A2C00007895	470pF,5%,50V,C0G,0603,TINNED,CER CAP/
2957	A2C00002190	2.2nF,10%,50V,X7R,0603,TINNED,CER CAP/
2958	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2963	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2964	A2C00002060	47pF,5%,50V,C0G,0603,TINNED,CER CAP/
2965	A2C00002107	100pF,5%,50V,C0G,0603,TINNED,CER CAP/
2966	A2C00002014	100nF,10%,25V,X7R,0805,TINNED,CER CAP/

3001	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3002	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3005	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3006	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3007	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3008	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3009	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3010	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3011	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3012	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3013	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3014	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3015	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3017	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3018	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3020	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3021	A2C00025198	1K8,1%,TK100,63mW,0603,LIN RES/
3022	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3023	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3024	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3025	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3026	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3027	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3028	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3029	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3030	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3031	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3033	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3034	A2C00004540	5K6,1%,TK100,63mW,0603,LIN RES/
3035	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3036	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3037	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3038	A2C00003838	220K,5%,TK250,63mW,0603,LIN RES/
3039	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3040	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3041	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3044	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3045	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3046	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3047	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3049	A2C00003812	6K8,5%,TK250,63mW,0603,LIN RES/
3050	A2C00027904	0R047,1%,TK200,1W,1218,LIN RES/PRC201
3051	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3052	A2C00025209	2K7,1%,TK100,63mW,0603,LIN RES/
3053	A2C00017792	1K2,1%,TK100,63mW,0603,LIN RES/
3054	A2C00025247	6K8,1%,TK100,63mW,0603,LIN RES/
3055	A2C00017790	5K1,1%,TK100,63mW,0603,LIN RES/
3060	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3061	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3100	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3101	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3102	A2C00003986	15R,5%,TK200,125mW,0805,LIN RES/
3103	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3104	A2C00003428	3K9,5%,TK250,125mW,0805,LIN RES/
3105	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3106	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3107	A2C00003418	22R,5%,TK250,125mW,0805,LIN RES/
3108	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3109	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3110	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3111	A2C00003792	330R,5%,TK250,125mW,0805,LIN RES/
3112	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3113	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3114	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3116	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3123	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3124	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3125	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3126	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3127	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3134	A2C00003811	2K7,5%,TK200,63mW,0603,LIN RES/
3136	A2C00003752	680R,5%,TK250,63mW,0603,LIN RES/
3137	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3138	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3139	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3149	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3153	A2C00003752	680R,5%,TK250,63mW,0603,LIN RES/
3156	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3157	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3158	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/

3161	A2C00003724	470R,5%,TK250,125mW,0805,LIN RES/
3201	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3202	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3203	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3205	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3206	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3207	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3208	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3209	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3210	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3211	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3212	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3213	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3214	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3216	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3217	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3218	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3220	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3221	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3223	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3225	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3226	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3228	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3250	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3251	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3254	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3351	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3403	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3404	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3405	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3406	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3407	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3410	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3486	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3487	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3488	A2C00003842	120K,5%,TK200,63mW,0603,LIN RES/
3489	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3500	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3501	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3503	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3514	A2C00003817	33K,5%,TK250,63mW,0603,LIN RES/
3515	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3521	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3527	A2C00003965	150K,5%,TK200,63mW,0603,LIN RES/
3528	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3530	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3531	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3532	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3533	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3534	A2C00025247	6K8,1%,TK100,63mW,0603,LIN RES/
3535	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3536	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3537	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3538	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3541	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3542	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3543	A2C00003853	470K,5%,TK250,63mW,0603,LIN RES/
3544	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3554	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3555	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3560	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3562	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3600	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3603	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3605	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3607	A2C00003410	22K,5%,TK250,125mW,0805,LIN RES/
3609	A2C00003410	22K,5%,TK250,125mW,0805,LIN RES/
3621	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3624	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3628	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3629	A2C00003778	10R,5%,TK250,125mW,0805,LIN RES/
3636	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3643	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3700	A2C00003690	1M,5%,TK200,63mW,0603,LIN RES/
3701	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3702	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3703	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3704	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3705	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3706	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/

3707	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3708	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3709	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3710	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3711	A2C00003996	1K2,5%,TK250,63mW,0603,LIN RES/
3712	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3713	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3714	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3715	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3716	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3717	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3718	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3719	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3721	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3723	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3724	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3725	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3726	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3727	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3729	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3730	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3731	A2C00003706	220R,5%,TK200,63mW,0603,LIN RES/
3732	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3735	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3736	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3737	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3738	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3739	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3740	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3741	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3749	A2C00003959	82K,5%,TK250,63mW,0603,LIN RES/
3751	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3756	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3759	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3800	A2C00005577	330K,5%,TK200,63mW,0603,LIN RES/
3801	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3802	A2C00003707	27K,5%,TK250,63mW,0603,LIN RES/
3803	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3804	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3805	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3806	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3807	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3808	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3809	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3810	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3811	A2C00027382	4R7,5%,TK200,63mW,0603,LIN RES/RC21
3812	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3813	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3814	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3817	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3818	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3819	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3823	A2C00004349	0R05,63mW,1A,0603,JUMPER/
3824	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3825	A2C00003837	22K,5%,TK250,63mW,0603,LIN RES/
3827	A2C00003838	220K,5%,TK250,63mW,0603,LIN RES/
3828	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3829	A2C53051389	RESISTOR PTC PRF18
3850	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3851	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3852	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3853	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3854	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3855	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3856	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3857	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3858	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3860	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3862	A2C00003828	2K2,5%,TK200,63mW,0603,LIN RES/
3864	A2C00003781	15K,5%,TK200,63mW,0603,LIN RES/
3865	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3867	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3868	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3869	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3870	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3871	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3872	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3873	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3874	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3875	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/

3876	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3877	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3878	A2C00003693	470R,5%,TK250,63mW,0603,LIN RES/
3879	A2C00003693	470R,5%,TK250,63mW,0603,LIN RES/
3880	A2C00003692	47K,5%,TK250,63mW,0603,LIN RES/
3881	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3882	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3883	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3884	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3890	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3891	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3892	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3893	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3894	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3895	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3896	A2C00003687	8K2,5%,TK200,63mW,0603,LIN RES/
3897	A2C00003851	56K,5%,TK200,63mW,0603,LIN RES/
3900	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3901	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3902	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3903	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3905	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3906	A2C00003779	100R,5%,TK200,63mW,0603,LIN RES/
3908	A2C00003685	10K,5%,TK200,63mW,0603,LIN RES/
3909	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3911	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3912	A2C00003825	10R,5%,TK250,63mW,0603,LIN RES/
3913	A2C00004463	10K,1%,TK100,63mW,0603,LIN RES/
3915	A2C00027820	10K,3620,0805,NTC/NTC
3950	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3951	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3952	A2C00003405	1K,5%,TK200,125mW,0805,LIN RES/
3953	A2C00003688	180K,5%,TK200,63mW,0603,LIN RES/
3954	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
3955	A2C00003684	100K,5%,TK200,63mW,0603,LIN RES/
3956	A2C00003708	3K3,5%,TK200,63mW,0603,LIN RES/
3957	A2C00003691	1K,5%,TK200,63mW,0603,LIN RES/
3958	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3959	A2C00003686	3K9,5%,TK200,63mW,0603,LIN RES/
3960	A2C00003407	100R,5%,TK200,125mW,0805,LIN RES/
3962	A2C00003689	4K7,5%,TK250,63mW,0603,LIN RES/
4101	A2C00004349	0R05,63mW,1A,0603,JUMPER/
5000	A2C00026943	97uH,10A,HOL,COIL/311111710910
5001	A2C00026976	10uH,2A,SMD,COIL/7A06N-100L
5002	A2C00027583	160nH,0A,SMD,COIL/BDS3/3/8.9-4S2
5003	A2C00026977	12uH,1.5A,SMD,COIL/7A06L-120K
5004	A2C00004974	80nH,5A,SMD,COIL/
5005	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5006	A2C00027583	160nH,0A,SMD,COIL/BDS3/3/8.9-4S2
5007	A2C00026977	12uH,1.5A,SMD,COIL/7A06L-120K
5008	A2C00004974	80nH,5A,SMD,COIL/
5009	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5010	A2C00004974	80nH,5A,SMD,COIL/
5011	A2C00026976	10uH,2A,SMD,COIL/7A06N-100L
5012	A2C00004974	80nH,5A,SMD,COIL/
5400	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5500	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5501	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5700	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5701	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5850	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
5851	A2C00026917	47nH,3A,SMD,COIL/BLM21PG300SN1J
5903	A2C00027149	10uH,150mA,SMD,COIL/NL322522T-100J
5904	A2C00027149	10uH,150mA,SMD,COIL/NL322522T-100J
5905	A2C00026916	955nH,200mA,SMD,COIL/BLM18AG601SN1J
6000	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6002	A2C00026373	16V,200mW,SOD323,ZENER/UDZS-TE17-16B
6004	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6005	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6006	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6007	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6009	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6016	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
6017	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
6100	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6101	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6102	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re 03
6103	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re 03
6104	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6105	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1

6106	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6107	A2C00027451	RED,LED,635m,OPTO/Q62703-Q2357
6108	A2C00028260	5.6V,400mW,Z,STAB DIODE/MM3Z5V6T1
6109	A2C00027451	RED,LED,635m,OPTO/Q62703-Q2357
6111	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6112	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re 03
6113	A2C00026370	11V,200mW,SOD323,ZENER/UDZS-TE17-11B
6115	A2C00019927	5.6V,200mW,SOD323,ZENER/GDZ5.6B 3kpcs re 03
6201	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6300	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6301	A2C00026865	30V,200mA,1,SCHOTTKY,SOD323,RECT DIODE/1
6500	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6501	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6509	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6601	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6614	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6803	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6804	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6851	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6852	A2C00026874	75V,250mA,1,FAST,SOD323,RECT DIODE/BAS31
6950	A2C00026375	20V,200mW,SOD323,ZENER/UDZS-TE17-20B
6951	A2C00026375	20V,200mW,SOD323,ZENER/UDZS-TE17-20B
6958	A2C53001683	DIODE STPS340S
6961	A2C52058752	DIODE SMBYT03
6962	A2C00006801	100V,1A,1,SCHOTTKY,SMB,RECT DIODE/MBRS11
7001	A2C00000446	BIP TRANSISTOR / BC847B NPN
7002	A2C00026299	1,OTHER,LOGIC/VN06SP
7003	A2C00026698	4.9V,40V,1.7A,VOLT REG/L4938NDP
7004	A2C00000446	BIP TRANSISTOR / BC847B NPN
7005	A2C00026529	8.16V,16V,1A,VOLT REG/LF85C
7006	A2C00000446	BIP TRANSISTOR / BC847B NPN
7007	A2C52058771	VOLTAGE SWITCH F/ ANTENNA, VN800
7008	A2C00026458	1,OTHER,LOGIC/SAA1305T
7009	A2C52058193	SWITCH_MODE VOLT_REG., LT1376CS-SL30399
7010	A2C52004675	POWER SUPERVISOR, LTC947
7012	A2C52058193	SWITCH_MODE VOLT_REG., LT1376CS-SL30399
7013	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7014	A2C53009401	FIXED VOLTAGE REG., LD1086D2T80
7015	A2C00027130	FET TRANSISTOR, SI3443DV
7016	A2C53017125	SWITCH_MODE VOLT_REG., LTC1772ES6
7017	A2C00000446	BIP TRANSISTOR / BC847B NPN
7018	A2C00000446	BIP TRANSISTOR / BC847B NPN
7101	A2C53002205	OP-AMP, 2-F., TS912
7103	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7104	A2C00000446	BIP TRANSISTOR / BC847B NPN
7105	A2C00025838	NPN,NORMAL,1A,80V,BIP/BCP56-16
7107	A2C00000446	BIP TRANSISTOR / BC847B NPN
7108	A2C00000446	BIP TRANSISTOR / BC847B NPN
7109	A2C00000522	BIP TRANSISTOR / BC857B PNP
7111	A2C00025838	NPN,NORMAL,1A,80V,BIP/BCP56-16
7112	A2C00000446	BIP TRANSISTOR / BC847B NPN
7203	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7207	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7250	A2C00030057	1,OTHER,LOGIC/PRASIC 1.2
7252	A2C00000446	BIP TRANSISTOR / BC847B NPN
7304	A2C00010657	DRAM,128Mbit,4*2Mbit*16,12ns,TSOP 54,-40
7305	A2C00010657	DRAM,128Mbit,4*2Mbit*16,12ns,TSOP 54,-40
7306	A2C53051172	NAND FLASH, K9F5608U0B-Y1B0
7404	A2C00026269	VOICE SYNTHESIZER, MSM6585GS
7420	A2C53002205	OP-AMP, 2-F., TS912
7500	A2C53058680	OP-AMP, 4-F., MC3302D
7502	A2C53022184	ADC, 1 CHANNEL, 12BIT, LTC1860IMS8
7503	A2C52058674	VOLTAGE REG., 5VDC, LE50
7600	A2C53026420	HEX SCHMITT TRIG. 74HCT14PW
7606	A2C00000446	BIP TRANSISTOR / BC847B NPN
7607	A2C00000563	45V,0.5A, h{FE} >250, SOT-23, fT=100MHz
7700	A2C00000446	BIP TRANSISTOR / BC847B NPN
7701	A2C00000446	BIP TRANSISTOR / BC847B NPN
7702	A2C00026733	RADIO DSP,OTHER IC/SAA7708/N203
7802	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7803	A2C00028411	4,AMPLI/
7850	A2C53050035	MICROPROCESSOR C161CS
7853	A2C00026596	EEPROM,32Kbit,4kX8BIT,0s,SO8,-40C,85C,ME
7854	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7855	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7856	A2C00026231	NPN,NORMAL,100mA,50V,BIP/PDTC124EU
7858	A2C53051173	FLASH MEMORY AM29F800B
7950	A2C00000446	BIP TRANSISTOR / BC847B NPN
7951	A2C00000446	BIP TRANSISTOR / BC847B NPN
7953	A2C00030056	1,MULTI,LOGIC/74HCT4053D